40 look

POPULAR
Computing
WEEKLY

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This Week

Vic software
Mike Grace looks at another range of games software for the Vic20 including a new version of Star Trek See page 14

Satellite Oscar-9
R Bradford presents a program which enables you to locate satellite Oscar-9 See page 17

New releases
Software Editor Graham Taylor presents a round-up of the latest games to come on the market for Dragon, Spectrum BBC and Commodore 64 on page 42

Dragon cam
R Walton explains how to calculate a cam and draw its profile in high-resolution graphics See page 25

★STAR
Searcher on Spectrum.
See page 10.
GAME★

News Desk

Hitch-hikers panic over adventure game dispute

by Graham Taylor

A LEGAL storm is brewing over Supersoft's launch of an adventure game based on *The Hitch-hikers Guide to the Galaxy* for the Commodore 64 Vic20 and Dragon versions of the game are expected to follow in a few weeks under a licensing deal with Audiogenic

This is something of a coup for Supersoft since a large number of software companies have been clamouring for the rights to produce games based on the highly successful books, radio and tv series

The Supersoft *Hitch-hiker* game was originally written for the Pet by civil servant Bob Chappell back in 1981 He asked Pan Books for permission to use places and characters from the book in a computer game and received a letter telling him that he could go ahead, provided that both Pan and *Hitch-hikers'* author Douglas Adams were credited

Bob Chappell then sold the game to Supersoft for around £500 worth of microchips and assorted programs — a fraction of the price such a game could now expect to command Computer games are a multi-million pound business — Atari is reputed to have paid an advance on royalties of more than £15m for the video game rights to *ET*

However Columbia Merchandising has signed a contract with Douglas Adams' agent Ed Victor to produce a *Hitch-hikers* film — Douglas Adams is currently in the US writing the film script — and part of the deal included the rights to produce a computer game

Zaphod Beeblebrox from the Hitch-hikers series. Photograph from the BBC

When informed of the Supersoft game, Ed Victor said 'Pan had no right to give approval and even if they did,

Continued on page 5

Continued on page 38


Richard Shepherd Software
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21-27 April 1983 Vol 2 No 15



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Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

This Week

Editorial

Future trends in the microcomputer industry are never easy to predict Pundits who regularly forecast what will happen in the next few months or years almost invariably seem to end up with egg on their faces

American manufacturers, software writers and consumers are waking up to the fact that micros are big business

Companies like Timex, which have imported British expertise, are developing their own indigenous talents New low-cost versions of the Texas and Atari machines are already proving popular

If Britain loses its hardware edge our programmers will lose the advantage they have built up through long familiarity with the Sinclair BBC and Dragon micros

It will still be possible to import micros from the US as soon as they are released but there will be no UK back-up as there is now

Ever since Clive Sinclair launched the ZX80 three years ago Britain has led the world in the field of low-cost microcomputers This lead is not going to disappear overnight, but it is being eroded quicker than some people might think

Next Thursday

Can you fly your plane through the rocks and bombs, and shoot the supply pods and invaders? Find out in Alpha Fighter, next week's game for the Vic20 with 3K memory expansion, by A Pette Also, in Reviews, John Scriven looks at a range of BBC educational software and Pythagorus' theorum is shown for the Spectrum

Probably the fastest microcomputer in the universe

the JUPITER ACE only £89.95.



For £89.95 you receive your Jupiter Ace, a mains adaptor, all the leads needed to connect to most cassette recorders and T.V.s (colour or black and white), a software catalogue and a manual.

The manual is a complete introduction to the world of personal computing and a course in FORTH programming on the Ace.

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The Jupiter Ace uses FORTH

The Ace is set apart from all other personal computers on the market by its use of a revolutionary language called FORTH. Some computer languages are easy for humans to understand, others are easy for computers. FORTH is most unusual in being both. Its underlying principles are so simple that it takes even a newcomer to computers only a few minutes to learn how to do calculations on the Ace, yet the very same principles are powerful enough to allow you to invent your own extensions to the language itself.

At the same time, the memory saving coded form used to store your programs inside the Ace allows it to obey them very fast — typically in less than a tenth of the time it would take to do the same thing using a different language. Amongst other things, this makes the Ace ideal for games.

FORTH's unique combination of speed, versatility and ease of programming has already made it a prime choice for professional applications as diverse as pub games and radio telescopes, and gained it an enthusiastic national user group. Now the Jupiter Ace can bring this addictive language into your own home.

Designed by Jupiter Cantab

Leading computer Designers Richard Altwasser and Steven Vickers have a reputation for pushing technology forwards. After playing the major role in creating the ZX Spectrum they formed Jupiter Cantab to develop their latest brainchild the Jupiter Ace.

Technical Specification

Hardware

Processor/Memory
Z80A running at 3.25 MHz
8K bytes ROM 3K bytes RAM

Input
40 moving-key keyboard with auto-repeat on every key

Output
Memory-mapped 32 x 24 character display with high resolution user graphics. Output to drive normal UHF TV set on channel 36

Sound
Provided by internal loudspeaker

Cassette
Load Save & Verify at 1500 baud, separate data storage

Software FORTH

Data Structures
Integer, Floating point and String data may be held as constants, variables or arrays with multiple dimensions and mixed data types

Control Stuctures
IF-THEN-ELSE, DO-LOOP, BEGIN-WHILE-REPEAT, BEGIN-UNTIL, all may be mixed and nested to any depth.

Operators
Mathematical + — X ÷
Logical AND, OR, NOT, XOR
Comparison < > =

Program Editing
FORTH words may be listed, edited and redefined. Comments are preserved when words are compiled.

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Hitch-hikers dispute

Continued from page 1

some recompense to Douglas Adams would have to be involved

I receive at least one request a week from computer companies who want to use the book but we have deliberately held off because we didn t want anything launched prematurely — a game could tie in beautifully with the film '

The Editor-in-Chief of Pan Sonny Mehta, is now taking legal advice over the Supersoft game I can t say anything except that we are very concerned " he said

Hitch hiker Douglas Adams

Martin Maynard of Andogenic confirmed that he planned to produce Vic20 and Dragon *Hitch-hiker* games and commented 'I understand Supersoft has a legal contract, it's a matter for them "

Peter Calver a partner in Middlesex-based Supersoft said We have no reason to withdraw the cassettes our solicitor says that there is no reason not to rely on the permission given in the letter

● As a final twist to the story Peter Calver and Douglas Adams both went to the same school — Sir Anthony Browne s Brentwood

Atari unhappy with ex-founder

ATARI has taken legal action in the US against its founder Nolan Bushnell to stop him from forming a rival company

When Bushnell sold Atari to Warner Communications for $15m in 1976 he agreed not to compete in the video games market until October 1983

But Bushnell has already sought funding for a new video game venture and recently purchased Vidia a video game research and development company made up of former Atari engineers

In filing suit against him Warner Communications claims that these developments, together with public statements by Bushnell claiming that he plans to capture 40 percent of the video games market within four years, violate the spirit of the agreement reached seven years ago

Computer companies look to low-cost disc system

MICROCOMPUTER companies are beginning to look for alternatives to cassette-based software as home taping shows signs of posing a real threat

One low cost option is the Hungarian MCD-1 3-inch micro-floppy disc system from BATS-NC1

This drive using a unique disc cassette medium, should be priced at around three quarters of the typical cost of a 5¼-inch drive

Following its implementation on the ZX81 by Macronics the device has been taken up by a number of manufacturers who plan versions for the Dragon, Vic BBC Model B, Commodore 64, Spectrum TRS-80 and Jupiter Ace

A single disc system is likely to cost around £200 but a twin-disc unit could cost as little as £300

Each of the single sided discs has a storage capacity of 200K with a track density of 100tpi Disc cassettes cost £4 each

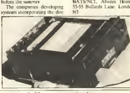
The major problem the system faces is acceptance — there is no established sub-5¼-inch disc standard and the BATS-NC1 system although considerably cheaper is in competition with the Sony 3½ inch drive

The MCD-1 is clearly intended for home computer application and its future may well depend on the response to it from the software houses

Another factor is availability — with the exception of the Macronics system — no other versions are likely to appear before the summer

The companies developing systems incorporating the disc are Premier Microsystems, 208 Croydon Road, Anerley, London SE20 (Dragon 32) Camania, Unit 1, Pines Trading Estate, Broad Street, Guildford Surrey (BBC and TRS-80) Microprocessor Engineering, 21 Hanley Road Shirley, Southampton (Dragon 32 Ace, Spectrum), Stein Mittell 12 Oakthorpe Road Oxford (Vic20 and Commodore 64), and Eddleman, 10 Trenton Close, Maidstone, Kent (Spectrum)

Details of the MCD-1 from BATS/NC1, Abacus House, 53-55 Ballards Lane London N3



Quicksilva pushes out the packages in one fell swoop

IN one fell swoop Quicksilva has this week launched 14 new titles

The games are for the Spectrum, ZX81 Vic20 BBC and Dragon 32 computers — and mark a continued diversification of Quicksilva into a whole range of machines The titles are

For the 16K Spectrum — *Astroblaster* (£4 95) and *Frenzy* (£4 95) For the 48K Spectrum — Pixel s *Trader* (£9 95) and *Word Processor* (£5 95) For the BBC Models A and B — *The Music Processor* (£14 95) For the BBC Model B only — *Protector* (£7 95) and *Wizard* (£6 95) For the Vic20 with 3K or 8K expansion — *Skyhawk* (£7 95) For the 16K ZX81 — *3D Black Star* (£4 95) *Damper and Glooper* (£4 95) *Pioneer Trail* (£3 95) *Ocean Trader* (£3 95) and *Cosmic Guerilla* (£3 95)

The launch marks a change of direction for Quicksilva as they become games publishers rather than games writers All the new releases have been produced by freelance programmers who answered a Quicksilva advertisement asking for new games

"We have very definite ideas about where the games market is going " commented Quicksilva's founder, Nick Lambert "and we are looking forward to becoming a full-time games publishing house

Spectrum chain adopts Micronet

THE Spectrum retail chain has concluded a deal with Micronet 800 the Prestel database to allow people to get information about Spectrum and to link up its dealers

Initially, the company will take 100 pages Fifty of these will hold information accessible by any Micronet subscriber These pages will show details of machines and software locations of the stores and news and availability of new computer systems

The remaining 50 pages will be used by Spectrum itself Each dealer will be able to use the system to order stocks from Spectrum and to find out pricing and delivery dates Using Micronet Spectrum will be able to communicate directly with any individual store Intercommunication between stores will also be possible if one shop is out of stock of a particular item it may be able to find another store who may be able to help

Each Spectrum store will use a BBC Model B machine together with a Modem supplied by Micronet

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Digging holes

Many thanks to A G Lucas (*Reversing the Charges* Vol 2 No 11) I had spent some time on *Reverse* but had not found the solution to line 240

I agree that *Dragon's Lair* will Run as printed but it Runs better if line 220 has the same order of line numbers as line 150 Even so the game is not what it purports to be — a game for several players — since, as written successive players do not start with the same lay-out

First the random positioning of the dragons' is inside the player loop To be the same for each player, the random numbers setting them out must be generated outside this loop

```
95 E = RND(28)+ 32 F =
   RND(28)+225 G = RND(14)
   +417 H = RND(14)+432 120
   PRINT @E a' etc
```

Secondly, any holes dug by use of the "*D*" key are not filled in for subsequent players A way of correcting this is as follows

```
70 Add at the end of the line M =
   0 N = 0
255 FOR Z = 0 TO 6
260 IF (D$ = D') AND (Y = 3 + Z *
    4) THEN M = X N Y RE
    SET(M N + 1) SC = SC+10
265 NEXT Z
267 IF X<>M AND Y>N+1 THEN
    SET (M N+1 1)
```

This allows only one hole to be dug and refilled per gallery' if more than one hole is dug, only the most recent is filled in This is fair since it puts an extra premium on digging holes — they make it easier for subsequent players'

F Hollman
7 Pellentine Rd
Follifoot
Harrogate
N Yorks

Lynx . . . 1

Congratulations on being the first magazine I have seen to publish a program for the Lynx I am a new Lynx owner and am enjoying putting my previous programming experience to the task of discovering some of the many things that the user manual does not mention

I think other Lynx owners may be interested in my findings and I hope they will pass on their own discoveries

1) To find whether the left or right arrow is being held down use *Inp &0980* — right arrow returning 233, left arrow returning 251

2) To find whether the up or down arrow is being held down use *Inp &0080* — up arrow returning 239 down arrow returning 223

These commands replace *Peeking* the keyboard buffer on other machines and will unlike *Get* or *Key* register if a key is held down and not just pressed

3) Ports *&0086* and *&0087* control the screen position To scroll the screen upwards use *Out (&0086) 12* then *Out (&0087) x* where *x*=the number of lines to be scrolled up To scroll left, use *Out (&0086) 13* then *Out (&0087) x* where *x*=the number of character spaces to be scrolled *Out (&0087) 0* resets the screen

If anyone knows how to *Peek* the screen to find what is in a character space will they please make it public

M Swindells
38 Westbourne Gardens
Hove
E Sussex BN3 5PP

Easy and useful

I am writing in response to the letter published from Ashley Buss (Vol 2 No 13)

I believe Mr Buss would find the following technique both easy and helpful when using *List* while debugging on the Dragon Using only the thumb and forefinger of the right hand one should hold down the *Shift* key (thumb) and stop/start the auto-scrolling with the @ and back-space keys

If both keys are pressed together the scroll moves up only one line at a time Again, the shift key should be held down with the thumb the forefinger bridging the others I trust Mr Buss will find this technique useful

F Hart
6 Siddons Way
Moulton
Northants

Lynx . . . 2

Recently, I bought a Lynx I have been messing about with the monitor and discovered that if you enter the monitor and type "*G BC*" — which means execute *BC* — you will be amazed to find two prompts You can exit the monitor by pressing *J* and run a whole program in double vision style

Alec Chattaway
170 Lister Avenue
East Bowling
Bradford BD4 7QU

Lynx . . . 3

Thank you for publishing Jason Orbaum's article 'A gift from the gods' (Vol 2 No 13) on handling string arrays on the Lynx In fact, he's wrong when he says 'the Lynx cannot handle string arrays of any sort I have been using bubble sorts without having to resort to his complicated subroutines admirably clever as they are

The first command is simply this

```
Dim X$ (Y) (Z)
```

where *Y* is the maximum length in characters of any one string, and *Z* is the maximum number of strings to be handled It means that the amount of memory to be reserved for string storage can be specified precisely The following program is well worth trying

```
10 ? MEM
20 DIM X$ (30) (420)
30 ? MEM
```

None of this is mentioned in the Lynx manual

Paul Davey
13 Sudeley Street
Brighton BN2 1HE

Expensive and mediocre

Speaking from the 'grass roots' level as a micro user I feel Commodore and John Baxter would do well to reconsider their position on home taping

As with most other newcomers, I bought my Dragon primarily to learn about programming The attraction was the sheer versatility of the machine If I do not like the game/utility or whatever, I can change it and record my own version Furthermore as in any other language it is a great advantage to study the techniques of other programmers

With the advent of the inexpensive home micro we have the opportunity to build a whole sub-culture capable of exploiting the system to its limits It is a great shame that Commodore do not share this vision

Again, speaking as a user, I feel that most of the programs on offer are expensive and at best mediocre A simple costing exercise will show there is a huge mark-up on cassette tapes One gets the impression that the micro industry is more interested in lining their own vaults, than in looking after their customers interests

Given the opportunity, I would say to John Baxter "If you cannot exploit the economies of scale and engender customer loyalty by giving sheer value for money, then perhaps it is time you considered some other market place You may want to sell robots, but your customers ain't!"

Thanks for allowing me to let off steam

D L George
33 Victoria Road
Shoreham by-Sea
West Sussex BN4 5LA

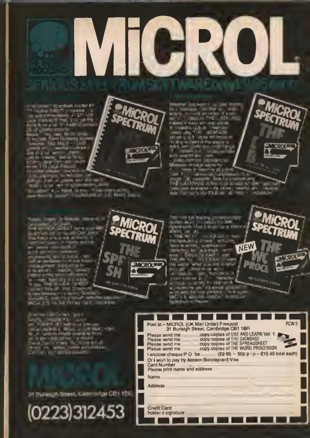
Is it propaganda?

I have been reading your magazine *Popular Computing Weekly* ever since I joined the ranks of microcomputer owners last summer However, on reading the issue dated 7-13 April 1983, under the heading of "Classified Ads", I find a political CND type advertisement under the name of "Programmers for Peace"

I use a computer for fun I also buy your publication for that reason If I require to read CND propaganda I need only pick up a newspaper I can watch or listen to the same propaganda on television I can see no need for magazines such as yours to carry such propaganda

Next week I shall pick up your magazine from the shelf and, should I find similar advertisements it will be replaced and I shall not purchase any further copies Might I suggest that you confine your comments to the subject of computing and leave politics alone

P G Clark
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Searcher

A new game for the 48K Spectrum by Andrew Filby

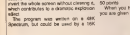
This program called *Searcher* has been written mainly in Basic but I have also used two machine code routines. The first machine code routine scrolls the whole screen from right to left which makes the graphics smooth and fairly fast. The second machine code routine is used to invert the whole screen without clearing it, which contributes to a dramatic explosion effect.

The program was written on a 48K Spectrum, but could be used by a 16K machine by lowering the machine code addresses.

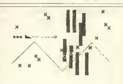
The object of the game is to fly for as long as possible without hitting the aliens or the walls. There are two kinds of alien: one is worth 20 points and the other is worth 40 points. Each wall dodged is worth 50 points.

When you have used your three lives you are given your score and a message suggesting how good your score was. Full instructions are included in the program.

The routine at line 4000 is used to find out if an alien has been shot by your laser. This routine enables *Inkeys* to recognise user-defined graphics. The code of the character is stored in the variable *I*.



```
   1 REM ************************
        *** S E A R C H E R ***
        *** © ANDREW FILBY. ***
        ************************
   2 CLEAR 64999: FOR f=65020 TO
 65043
   3 READ A: POKE F,A
   5 NEXT f
  10 FOR F=144 TO 152: FOR G=0 T
O 7: READ a: POKE USR CHR$ F+G,A
: NEXT G: NEXT F
  15 GO SUB 8000
  20 LET L=1: LET SC=0: LET X=3:
 LET Y=10: LET FL=1000: LET M=21
  30 BORDER 4: PAPER 4: CLS : LE
T AS=1: INK 6: PAPER 0: CLS : BO
RDER 0
  40 RANDOMIZE : LET A=INT (RND*
10)
  45 PRINT AT Y,X; INK 2;"■"
  90 LET A$=INKEY$
  91 IF SC>=1000 THEN GO SUB 600
0
  92 IF AS=1 AND SC>=1000 THEN L
ET AS=0: PRINT AT 0,20;"WATCH OU
T!"
  95 LET SC=SC+1: GO SUB 3000
  96 LET F=X+1: PRINT AT Y,X-1;
OVER 1;"■": GO SUB 4000: IF I
=149 OR I=151 OR I=152 THEN PRIN
T AT Y,X; FLASH 1; PAPER 2; INK
1;"■": FOR F=40 TO -30 STEP -10:
 BEEP .03,F: LET z=USR 65025: N
EXT F: BEEP .1,-35: LET L=L+1: I
F L=4 THEN GO TO 5000
 100 GO SUB FL: PRINT AT Y,X-1;
INK 2; OVER 1;"■"; INK L;"■";:
BEEP .004,-10
 110 PRINT AT Y,X-1;" "
 116 IF A$<>"8" AND A$<>"5" AND
A$<>"6" AND A$<>"7" THEN GO TO 1
25
 117 PRINT AT Y,X; OVER 1;"■"
 120 IF A$="7" AND y>0 THEN LET
Y=Y-1
 121 IF A$="6" AND y<21 THEN LET
 Y=Y+1
 122 IF A$="8" AND X<20 THEN LET
 X=X+1
 123 IF A$="5" AND X>1 THEN LET
X=X-1
 125 PRINT AT Y,X; INK L; OVER 1
;"■"
 130 IF A$<>"9" THEN GO TO 140
 131 FOR F=X+2 TO X+11: GO SUB 4
000: IF I<>149 AND I<>152 THEN P
RINT AT Y,F; INK 7; OVER 1;"-";:
 BEEP .0005,50: NEXT F: GO TO 13
8
 136 PRINT AT Y,F; PAPER 2; INK
7;"■": FOR Q=30 TO 0 STEP -10:
BEEP .01,Q: NEXT Q: PRINT AT Y,F
; OVER 1;"■": LET SC=SC+20: IF
I=152 THEN LET SC=SC+20
 138 FOR G=X+2 TO F-1: PRINT AT
Y,G; OVER 1;"-";: NEXT G
 200 GO TO 90
1020 PRINT OVER 1;AT M,31;"/"
1030 LET Z=USR 65000
1040 LET M=M-1: IF M=A THEN LET
FL=2000: LET A=21: LET M=M+1
1050 RETURN
1090 GO TO 1010
2020 PRINT OVER 1;AT M,31;"\"
2030 LET Z=USR 65000
2040 LET M=M+1: IF M=A THEN LET
FL=1000: LET M=M-1: LET A=INT (R
ND*10)+10
2050 RETURN
3010 IF RND>(.8-(L/10)) THEN LET
 RND=(RND*20)+1: PRINT AT RND,31
;"■": FOR F=30 TO 50 STEP 10: BE
EP .01,F: NEXT F: IF RND>.7 THEN
 PRINT AT RND,31;"■"
3040 RETURN
4000 POKE 23606,PEEK 23675: POKE
 23607,PEEK 23676-1
4010 LET I=CODE SCREEN$ (Y,F)+11
3
4020 POKE 23606,0: POKE 23607,60
: RETURN
5000 FOR f=0 TO 60 STEP 8: BEEP
.005,f: LET z=USR 65005: NEXT f
5010 BORDER 1: PAPER 1: INK 7: C
LS : PRINT TAB 13;"SEARCHER";AT
0,13; OVER 1;"________"''''"Y
OU SCORED ";: FLASH 1;SC;: FLASH 0
;" POINTS."
5020 IF SC<200 THEN LET A$="CAN
YOU RIDE A CYCLE ???"
5021 IF SC>200 AND SC<500 THEN L
ET A$="I CAN TELL YOUR A LEARNER
"
5022 IF SC>600 AND SC<1500 THEN
LET A$="NOT BAD,KEEP TRYING"
5023 IF SC>1500 AND SC<2500 THEN
 LET A$="QUITE GOOD !"
5024 IF SC>2500 AND SC<4000 THEN
 LET A$="BRILLIANT !!!!"
5025 IF SC>4000 THEN LET A$="AMA
ZING !! AMAZING !! AMAZING !!"
5030 PRINT '''A$
5040 BEEP .5,0: PRINT '''"PRESS A
NY KEY FOR ANOTHER GO": PAUSE 0:
 RUN
5999 STOP
6000 RANDOMIZE : IF RND<.8 THEN
RETURN
6005 LET D=INT (RND*16): FOR F=D
 TO D+5: PRINT AT F,31;"■": NEX
T F
6010 LET SC=SC+50: RETURN
8000 PAPER 7: INK 0: BORDER 7: C
LS
8010 PRINT TAB 13; INK 2;"SEARCH
ER";AT 0,13; OVER 1;"________"
8020 PRINT "YOU COMMAND YOUR SHI
P(■) USING KEYS -"
8021 PRINT TAB 5;"7 FOR UP ,8 FO
R FORWARD"
8022 PRINT TAB 5;"6 FOR DOWN ,5
FOR BACKWARD"
8023 PRINT TAB 10;"9 FOR FIRE"
8024 PRINT '"YOU ARE ALWAYS MOVI
NG FORWARDS SO BEWARE! YOU MUST
 TRAVEL AS  FAR AS YOU CAN TO C
OLLECT POINTS,TO HINDER YOU ALIE
NS(■,■)APPEAR AT RANDOM,A ■=20 PO
INTS,A ■=40  FOR EACH ALIEN SHOT
.IF YOU CRASH INTO AN ALIEN YOU W
ILL BE ■■■■■■■■■■"
8025 PRINT ''IF YOU REACH 1000 PO
INTS WALLS(■)WILL START TO APPEAR
,YOU CANNOT DESTROY A WALL SO YO
U MUST GO  AROUND IT,EVERY WALL
 DODGED IS  WORTH 50 POINTS."
8026 PRINT "YOU MAY GO BELOW THE
 HILLS AS  YOU MOVE FORWARD."
8030 INPUT "Press ENTER to start
"; LINE a$
8040 RETURN
9000 DATA 6,192,17,0,64,213,225,
35,197,1,31,0,22,237,176,45,54,0
,35,35,16,193,16,240,201,33,0,64
,0,24,197,6,0,126,230,255,119,35
,16,249,193,16,245,201
9002 DATA 64,96,112,112,254,127,
255,127
9010 DATA 0,0,0,0,224,240,254,25
5
9020 DATA 128,64,32,16,8,4,2,1
9030 DATA 1,2,4,8,16,32,64,128
9040 DATA 0,0,0,6,31,63,31,6
9050 DATA 195,102,60,90,90,60,10
2,195
9060 DATA 17,80,17,140,0,34,70,1
9070 DATA 239,239,187,187,239,23
9,187,187
9080 DATA 66,36,189,189,60,255,1
29,195
```



Variables used –

```
F=FOR/NEXT LOOP
G=FOR/NEXT LOOP
A=HEIGHT OF MOUNTAIN
SC=SCORE
X=X CO-ORD OF SHIP
Y=Y CO-ORD OF SHIP
FL=MOUNTAIN GOING UP OR DOWN
H=INCREASING/DECREASING HEIGHT
  OF MOUNTAIN
AS=OVER 1000 POINTS?
RND=HEIGHT OF NEW ALIEN
I=CODE OF USER GRAPHIC
Z=CALL OF MACHINE CODE
L=LIVES
D=RANDOM POSITION OF WALL
Q=FOR/NEXT LOOP
A$=MESSAGE
```

GRAPHIC CHARACTERS

```
A=■        B=■
C=\        D=/
E=■        F=■
G=■        H=■
I=■
```

Tandy support . . .

***David Kelly** talks to John Sayers, managing director of Tandy (UK)*

Last year the Tandy Corporation showed world-wide net sales of over £1 75 billion through over 8 000 retail outlets

Sales of computers alone are expected to top £500m this year with no sign of the upward trend beginning to slow

These figures emphasise the scale of the Tandy enterprise The company sells every conceivable kind of electrical and electronic goods — from metal detectors to music synthesisers The range of computers extends from small pocket computers up to substantial business systems

Strange then that the Tandy Corporation began in 1927 in an altogether different industry Two ambitious men founded the Hinckley-Tandy Leather Company in Fort Worth Texas In 1950 the two partners split up, with Charles Tandy concentrating the new Tandy organisation on the leather handicraft business selling by mail-order and through a growing number of retail outlets Sales rose quickly to a peak of over £17 million and then began to fall quite dramatically so that in 1955 the company diversified into a range of activities including petroleum and jet aircraft

Then in 1964 the Tandy Corporation acquired an ailing mail order electronics business called Radio Shack And the rest, as they say is history

Tandy first appeared in the UK 10 years ago — John Sayers the British company's present managing director joined the company as a store manager in 1974

We opened up in this country in a big way — by the end of the first year we had over 100 stores The total went up to 120 and in the next three years we lost an enormous amount of money! he says

"Since then we haven't looked back!"

"It wasn't until our first computer, the TRS80 Model 1 4K machine was introduced in Britain in the autumn of 1978 that we began to make money

Since then we haven't looked back — we now have 230 stores

Included in the number of stores are 24 dedicated computer centres These outlets deal only with the computer side of the company and offer support to the user

We are selling basic computer literacy The specialist stores do not just sell computers — we offer a comprehensive classroom/tutorial facility and engineering support at our centres

Tandy now has a very wide range of computers — from the Tandy Color Computer to our range of pocket computers and our new portable machines right through to the business machines — the Model 16 and Model 12

To support all that we have a central telephone enquiries service We can solve 80 percent of enquiries immediately Another 15 percent we will find out about and phone the user back For the remaining 5 percent we may have to go to Tandy in the US for the answer We are quite proud of that service

Although the TRS 80 Color Computer has been very successful in America it does not seem to have achieved the same level of success in Britain The computer and peripherals probably account for only about 18 percent of the company's UK computer sales

"I suppose that is partly historical We brought the business machine over before the home machine and consequently we are seen as being more on the business side than we probably are From Tandy's point of view the business market may well seem more attractive Certainly the home computer market is very competitive in the UK with home-grown companies like Sinclair, Dragon and Acorn taking a big slice

"We know the Color Computer is good"

The Tandy Color Computer is a product which we will market aggressively And we know it is good because already there is a look-alike of it — the Dragon People are aware that the two computers are similar and Dragon has done us some good in a market in which we haven't advertised heavily We have cleared a lot of software and we have orders for our CGP 115 four-colour printer/plotter coming out of our ears

We offer what is probably the best range of printers We buy in stocks knowing that we will sell a proportion to owners of other machines If we ordered stocks on a one to one basis with Color Computers we would never have any peripherals in stock Obviously I would prefer to sell them to be used on our own machine but I can't complain We sold out of our Colour Computers at Christmas

"It is software that sells the hardware Although we have some 37 packages for the Color Computer that is one of the reasons I'm not against the Dragon They are putting money into software development — It is very much a two way process and they have done us a lot of good

At the moment our main problem with the Color Computer is price despite the fact that it is manufactured in Korea. The main currency there is the dollar so it is extremely difficult to get a good price with the pound being so weak

If you say to me Justify your computer against the Dragon then on hardware terms alone I cannot But in terms of back up, customer help and servicing I think we offer more support than anyone else Our staff undergo an intensive training course which extends not just over the home computer end but right up to the big business systems like the Model 16 And it is that depth of knowledge and technical expertise that a department store cannot match People don't want to struggle to learn to program and that's where the back-up is all important

Another area in which Tandy is strong is education Several local education authorities have adopted the TRS 80 for the classroom because the company offers a unique networking system for 16 machines called the Classroom Concept

We have a department dedicated to the Classroom Concept run by an ex headmaster who was a Tandy convert back in 1980 To put one micro in a school is pointless You would get the best use from it by giving it to the caretaker or the person who plans the timetables rather than putting it in the classroom That is why our networking system has been so successful — despite the fact that we are not included in the Government Grants scheme

Again the most important thing we can offer is back up support We offer teachers free tutorials as part of our package

Computers now represent 36 percent of Tandy (UK)'s business and most of the company's resources are going into new computer stores Next year Tandy plans to open about 20 new stores, of which 15 will be computer stores Worldwide computer products account for 33 percent of sales This year John Sayers estimates they will break $1 billion on computers and, as he says that is a *big* number

In 1978 when the first TRS-80 Model 1 came over we were all apprehensive about it — none of us anticipated the growth we have seen At first we had one machine with 4K Then it went to 16K then discs Now we have a 16 bit machine with 512K I lose track of the numbers

"We announced that we would be launching five new machines in 1983 and we have now given details of three of these — the new business machine the Model 12 the pocket computer the PC4 and the Model 100 portable computer

"I expect computers to account for over 40 percent of our business in Britain next year — and who knows after that. A lot depends on new products and we have one new product in particular this year that will shake things up

A bird's eye view . . .

Mike Grace emerges from the Pharaoh's tomb to test another batch of Vic software

The sun is shining outside and the thought of digging up a few weeds whilst softly contemplating life in general (a quiet and definite reason for taking up gardening is to shake the microchip mania out of my brain at intervals) is beginning to seem almost attractive. I stare at the slightly thickening clouds on the horizon and decide that it's beginning to look like rain. With a sigh of relief I sit gently down in front of my Vic and begin to load another cassette, a movement that is becoming as automatic as breathing.

It seems occasionally as though time moves at a different pace when one is sitting at a computer (this is not an original idea of mine as I read a very clever letter in a computer magazine about the theory of relative time and the vicinity of the microchip). Nonetheless, it is true that once I sit down in front of the Vic time seems to fly by in the outside world — in fact once I rose from a short spell of programming (about 40 minutes I'd estimate) to discover that it was past midnight and the rest of the house was abed. Thus it is when I review the items of software that the editor of *Popular Computing Weekly* sends me.

But enough of this philosophy — back to the games. And let's start with a good 'un this time (looking back over my previous reviews it seems I often begin with the poor items and move up to a climax with the best), a 16K version of *Star Trek*. I'd already reviewed the basic game so when I received another version from Wessexsoft it was with interest that I wondered how it would compare.

Wessexsoft is a one-game company at the moment, run by Douglas Sneddon who sent a very nice and informative letter with the game describing a few points about playing and a little personal history. It took five months to complete the programming (I can well believe it) and the author claims there are several 'extra' touches like a different service number on the Klingon ships when you destroy them. Having read the letter I sat back and waited for the instructions to load.

For those of you unfamiliar with the *Star Trek* concept, you are in control of the *Enterprise* and your task is to seek out and destroy the Klingons in your sector of space. To do this you must move the ship across various 'Galaxy Maps' and then by pressing a key letter you can view sectors of space to see if a Klingon is nearby. Having found one or more, you may try to destroy them by firing photon torpedoes or phasers — but they can also fire at you.

The last game I played had no graphics. The essence of the game is one of skill in isolating the enemy and then being able to direct your fire by keying in the right co-ordinates — thus it is not a 'wham bam' invaders type but a game of skill which takes place mostly in the imagination. But, Wessexsoft has introduced some excellent graphics, starting right at the beginning with a very neat side view of the *Enterprise* which rises from the bottom of the screen, remains there whilst the titles appear in staccato form below the ship, then slowly descends again prior to the usual request for 'Instructions and Playing Hints'.

The 'human' touch!

This tremendous effort in the presentation of what is basically just the title of the game (which must have taken many hours of programming alone) is what I have been talking about in previous reviews. To me, presentation of the game is almost as important as the game itself. An excellent game can be spoiled by sloppy graphics (if any) and lack of care, whilst an average game becomes enjoyable if the programmer has obviously taken pains with it. Well, *Star Trek* 16K has extremely professional graphics plus the advantage of already being a good computer game. Wessexsoft has a good start.

After this impressive beginning, there is a series of instructions to read (a few minor mistakes here in spelling and punctuation) — I felt these to be inadequate for the novice player, as some of the rules of the game were not explained clearly enough. Then, we're waiting again whilst the tape continues to load the game into memory. It would be nice to have a facility to bypass the instructions as, once you've played the game a few times, they are no longer necessary.

Being 16K, loading seems to last forever (I do wish a few more software houses would release material on disk for those of us who do have the 1540). Then suddenly the *Enterprise* flashes back on the screen and a pod moves up to dock in the main ship (presumably we've come up this way as the transporter wasn't fully operational!) and then the game really does start. First instruction is the skill level (1-10) and I pressed 12 to see how well the program would cope with idiots. A very professional error message flashed up (Wessexsoft uses excellent colour messages all through the game) so this time I keyed in 1 (I'm no fool when I start a game) and away we went.

I won't give too much away, but suffice it to say that this version of *Star Trek* is as enjoyable as any other (except that every time you warp there is a short delay whilst the Vic makes the noise of a spaceship taking off, a habit I quickly found wore very thin when I wanted to get on with the game), and I liked the graphics of a Klingon being blasted when I did succeed in destroying one. One feature that the authors have put in is a 'human' touch in that some of the messages are supposed to be either friendly or sarcastic — at the end of one game I was told to report for the 'accidental' destruction of one of my own star bases! I didn't even do it either!

All in all, though, at £9.50, I found this game to be better than many I've seen from the so-called 'professional' houses and I hope Douglas Sneddon starts on another game soon.

Now, I am not a great arcade player (in truth I am not an arcade player at all as I cannot see the sense in dropping money into someone else's machine when I have my Vic at home), so it came as something of a surprise to discover that everyone seemed to be playing (or at least talking about) a game called *Krazy Kong*. In this game you have to climb up various ladders and along girders to rescue a fair damsel who has been captured by Kong, the giant ape who stands expectantly at the top of the screen waiting for you. Meanwhile Kong rolls a limitless supply of barrels at you to try and stop you from reaching the girl. And there are usually other hazards such as falling off a girder to be splatted on the floor.

Anirog's version for the 16K Vic arrived the other day and it looks a whole lot slicker than several versions I saw at a computer exhibition recently. But my first attempts to play the game ended in frustrated failure — I just could not dodge the barrels fast enough to get to the girl (who looks more like a bloke than Fay Wray in this particular version). Persistence won through though, and after about an hour I had at last reached her to discover that in Anirog's game there are several screens to work through. The next version is, of course, harder and you only have two lives instead of three.

It appears there are at least four screens to reach (to date I have only managed three) and the advertisement promises a spectacular collapse of Kong's lair in the



fourth screen Can t wait! The price of the game is only £7 90 which seems unbelievable to me The game is worth that price for the graphics alone and there are plenty of extras such as picnic hampers umbrellas and mallets (to smash barrels and gain extra points) You can use a joystick or keys (though how anyone could work the keys and watch the screen fast enough is beyond me — and I did try it) Still the game is excellent value for money — and if you don t give up too soon it does become extremely addictive I was very late to bed the first time I tried it (it s that trick with time again, I suppose)

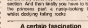
Next out of the bag came a graphics adventure, *The Wizard and the Princess*, from Melbourne House for the unexpanded Vic and priced at £5 95 I've reviewed the more traditional text adventure games before but this was the first time I had tried a graphics one I loaded the tape and waited After quite a short time the screen turned red at the borders and began to paint a picture of blue skies and green countryside (with a few trees dotted about looking like the trees in *Ski Run*) There was a quite realistic cold wind blowing on the sound effects I was told I could only move left (by pressing L), right or forward (pressing R and F of course)

My task was to find the wizard s castle At first I seemed to be pressing keys to no avail as all that happened was that I fell off some mysterious pyramid structure, totally without explanation or was confronted by the same green wasteland then suddenly I was looking at a castle (plus bird song on the soundtrack) and a few presses of F brought me to the instruction to press *Run* and *Shift* so that the tape could load the next part of the adventure into the Vic

This is quite an ingenious method of getting long and interesting games into the 3 5K of the unexpanded Vic and I applaud the people who do it for supplying a better standard of game to the owners of the basic computer Anyway back to our adventure and the next stage is a dragon (very well portrayed with high-res graphics) that you have to stab in the throat — not too hard to accomplish

We move on to the next stage of the story which is one of the hardest things I have ever come across in a computer game Basically, you are inside a maze, only instead of the usual bird s eye view of the maze you are actually inside it and can only see the walls and passageways off to left and right As you move forward so the scene shifts and by turning left and right you can decide whether to go one way or another This is extremely hard and I found it essential to plot the maze on paper otherwise I would never have completed it

Having found your way through you are next in a series of rooms and have to find and rescue the princess before a monster gets you (this time the rooms are drawn from above) or you are wounded or even killed One nice aspect of this game is that if you are zapped by a monster you are not sent all the way back to the very beginning, you only have to start this particular part of the adventure — very handy as I was consistently beaten by the monsters in this section And then finally you have to take the princess past a nasty-looking troll whilst dodging falling rocks

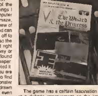


A certain fascination

At the end of it all I was impressed by the package although parts of the adventure proved tiresome as it is written in Basic and so is quite slow I liked the maze especially (a real challenge this) and the graphics on the dragon were very atmospheric This is one adventure game that is not impossible and is quite fun to do again Very good value for £5 95

The final game of this review is another graphics adventure, from Anirog again for the 16K Vic and priced at £6 00 Called *Pharaoh's Tomb* the basic idea of this game is to enter the ancient Egyptian tomb and avoid the various traps on your way to the magic triangle — shades of *Raiders of the Lost Ark*!

A little man moves up down left or right by key control (no joystick for this game a distinct disadvantage I felt) The game is a blend of the traditional adventure in that there are various directions in which you can travel from room to room with various objects to pick up along the way, but instead of the text you get graphic drawings of the rooms and the objects



The game has a certain fascination and is a definite improvement on the limited scope of *The Wizard and the Princess* but the fact that the graphics are provided tends to detract from the real appeal of the text adventure — the power of the imagination Gone are the mysterious dragons the trolls the vistas of countryside that reside in my own memory and imagery to be replaced by the very basic drawing ability of the Vic For that reason I suspect the fact that once you have been killed in one way or another and have to start right back at the beginning again is a real drag After all, the man's progress across the passageways is very slow, and you have to keep your finger on the appropriate key all the time

The adventure itself has been well constructed and I have yet to solve it For the player who needs stimulation and challenge this game can provide it for the hazards include giant spiders holes that appear out of nowhere and swallow you up, sandtraps and other nasties lying along the way, as well as locked doors that don't open until you ve found just the right key The game is enjoyable — but as I ve already said lacking in something Still, at £6 00 it is remarkable value for money (a feature Anirog seem to be noted for)

Well it s time to end again As I emerge from my Vic and return to the normal world I discover to my horror that it didn t rain after all — that the garden is as dry as can be expected at midnight — and that, as before the rest of the house seems to have gone to bed Seems impossible! It *is* impossible, but maybe Einstein knew a thing or two about computers ■

Firm	Program	Cost	Value (1-10)
Anirog Computers 26 Balcombe Gardens Horley Surrey	*Krazy Kong* *Pharaoh s Tomb*	£7 90 £6 00	9 7
Melbourne House 131 Trafalgar Road Greenwich London SE10 9TU	*The Wizard and the Princess*	£5 95	6
Wessexsoft (D A S Sneddon) 18 Eastlake Avenue Parkstone Poole Dorset BH12 3DG	*Star Trek 16K*	£9 50	8

The sky at night . . .

***R Bradford** presents a program for all budding astronomers – locating satellite, Oscar-9*

This program for the 16K Spectrum is for locating UOSAT/OSCAR-9 the satellite at present transmitting data via a voice synthesiser. To listen to this satellite two things are required: first a 145.8 Mhz receiver, and secondly the location of the satellite. This program provides the latter giving a list of *Azimuth/Elevation* coordinates at a given time.

To listen to this satellite, use a portable radio with aircraft and marine band frequency receqtion. Reception is quite good on a high pass, consisting of a male voice reading a senes of numbers and short words. If a hand-held receiver is used then I suggest that it is used out of doors. OSCAR 9 is not always visible on every pass over the northern hemisphere.

Two sets of data are required, the location of the observer (a quick look in an atlas can provide this) and the equatorial crossing time and bearing of the satellite for the orbit in question. The satellite data is available from the University of Surrey (phone Guildford 571281).

For those not familiar with astronomy *Azimuth* is the angle in degrees from North, ie 90 = East 180 = South 270 = West. *Elevation* being the height above the horizon in degrees.

Test results
Ground Station Co-ordinates 50 North 0 West
Equatorial Crossing Time 2348 Bearing 320 West

Time	Azimuth	Elevation
2358	93	2
2400	72	7
0002	46	6
0004	22	4

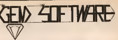
A breakdown of the program follows along with a test result.

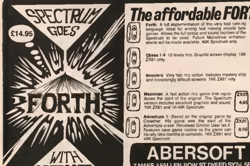
1000 to 1030 Initialise
1040 to 1130 Input variables
1140 to 1180 Table heading
1190 to 1330 Main program loop
1340 to 1440 Questions
1490 to 1490 Calculate next orbit
1500 to 1570 Input new satellite data
1580 to 1620 Adjust time
1630 to 1640 Set constants
1650 to 1700 Input instructions
1710 to 1760 Time update
1790 to 1770 Data for input indication

Only one *Poke* has been used in this program and that is for setting the "CAPS LOCK" — *Poking* the same address with 0 will return the keyboard to lowercase ■

```
1000 LET O$="OSCAR-9 Azimuth/El
ivation Table"
1010 GO SUB 1630
1020 CLS
1030 PAPER 7: BORDER 7: INK 1: P
RINT O$
1040 PRINT AT 3,0;"PLEASE ENTER
AS INDICATED"
1050 RESTORE 1760
1060 FOR Q=0 TO 5: READ A,A1,A2,
A3,A4,A5
1070 GO SUB 1680
1080 IF Q=0 THEN PAUSE 50
1090 IF Q=1 THEN INPUT ,LA
1100 IF Q=2 THEN INPUT ,LO
1110 IF Q=3 THEN INPUT ,W
1120 IF Q=4 THEN INPUT X$: IF V
AL X$<=0 OR VAL X$>2400 THEN GO
TO 1120
1130 NEXT Q
1140 LET L=LA*I: LET Q=LO*I
1150 CLS : PRINT O$'AT 2,0;"Sate
llite Position for ground stat
ion at co-ordinates";LA;" north
",LO;" west"
1160 LET PP=6
1170 PRINT AT PP,0;"Time";AT PP,
10;"Azimuth";AT PP,20;"Elevation"
: LET PP=PP+1
1180 PRINT AT 22,0; INK 4;"
CALCULATING"
1190 LET T=2
1200 LET B=ASN (P*SIN (M*T/J))
1210 LET C=ACS ((COS (M*T/J))/(C
OS B))+(T*4)/(1*3)
1220 LET T=T+2
1230 IF T>40 THEN GO TO 1330
1240 LET Z=ABS (C-Q): IF Z>PI TH
EN LET Z=2*PI-Z
1250 LET D=ACS (SIN L*SIN B+COS
L*COS B*COS Z)
1260 IF D>0.4 THEN GO TO 1220
1270 LET AZ=K*(ACS ((SIN B-SIN L
*COS D)/(COS L*SIN D)))
1280 IF C>Q AND C<(PI+Q) OR C>(M
+Q) OR C<(Q-PI) THEN LET AZ=360-
AZ
1290 LET EL=(PI/2-(ATN (M*SIN D/
(M*COS D-6371))))*K
1300 GO SUB 1580
1310 GO SUB 1640
1320 GO TO 1220
1330 IF PP=7 THEN PRINT AT 20,0;
INK 3;"SATELLITE NOT VISIBLE TH
IS ORBIT": GO TO 1350
1340 PRINT AT 20,0; INK 2;"
END"
1350 PAUSE 200: POKE 23658,8
1360 PRINT AT 20,2;"DO YOU WISH
TO PROCESS MORE DATA(Y/N)"
1370 IF INKEY$="" THEN GO TO 137
0
1380 IF INKEY$="N" THEN GO TO 14
30
1390 CLS : PRINT O$: PRINT AT 10
,0;"SAME GROUND STATION CO-ORDIN
ATES(Y/N)"
1400 PAUSE 50: IF INKEY$="" THEN
 GO TO 1400
1410 IF INKEY$="N" THEN GO TO 10
20
1420 IF CT=2 THEN CLS : PRINT AT
 10,7; INK 2;"ACCUMULATIVE ERROR
";AT 11,0; INK 2;"NOW SIGNIFICAN
T": PAUSE 100: GO TO 1500
1430 CLS : PRINT O$: PRINT AT 10
,0;"NEW SATELLITE POSITION DATA
"(Y/N)"
1440 PAUSE 50: IF INKEY$="" THEN
 GO TO 1440
1450 IF INKEY$="Y" THEN GO TO 15
00
1460 PRINT AT 13,0;"DATA FOR NEX
T ORBIT   BEING CALCULATED"
1470 LET T2=((VAL T$)+20+J): GO
SUB 1710
1480 LET T$=STR$ (T2): LET X$=T$
: LET W=W+23.607: LET CT=CT+1
1490 PAUSE 70: GO TO 1150
1500 LET CT=0: RESTORE 1770
1510 CLS : PRINT O$;AT 5,0;"ENTE
R AS INDICATED"
1520 FOR Q=1 TO 3: READ A3,A4,A5
1530 GO SUB 1690
1540 IF Q=1 THEN INPUT W
1550 IF Q=2 THEN INPUT X$: IF VA
L X$<=0 OR VAL X$>2400 THEN GO T
O 1550
1560 NEXT Q
1570 STOP
1580 LET T2=VAL X$: LET T2=T2+T-
2
1590 GO SUB 1710
1600 LET T$=STR$ (INT (T2)): LET
 Y=4-LEN (T$)
1610 LET V$="0000": LET Z$=V$( T
O Y): LET T$=Z$+T$
1620 RETURN
1630 LET CT=0: LET M=2*PI: LET I
=PI/180: LET J=95.708880: LET K=
57.3: LET M=6801: LET P=0.99103
: RETURN
1640 LET PP=PP+1
1650 LET ELU=INT EL: LET AZI=INT
AZ
1660 PRINT AT PP,0;T$;AT PP,12;A
ZI;AT PP,24;ELU
1670 RETURN
1680 PRINT AT 7,0; INK A;"GROUND
 STATION CO-ORDINATES";AT 9,0; I
NK 1; BRIGHT A1;"LONGTITUDE in d
egrees north";AT 11,0; BRIGHT A2
;"LATITUDE in degrees west"
1690 PRINT AT 14,0; INK A3;"SATE
LITE LOCATION DATA";AT 16,0; INK
 1; BRIGHT A4;"Equatorial crossi
ng bearing in  degrees west";AT
19,0; BRIGHT A5;"Equatorial cros
sing time";AT 20,0;"(24 HOUR MOD
E)"
1700 RETURN
1710 GO SUB 1740
1720 LET T1=T2-(INT (T2/100))*10
0
1730 IF T1>=60 THEN LET T2=T2+40
1740 IF T2>2400 THEN LET T2=T2-2
400
1750 RETURN
1760 DATA 1,0,0,1,0,0,2,1,0,1,0,
0,2,0,1,1,0,0,1,0,0,2,1,0,1,0,0,
0,0,1,1,0,0,1,0,0
1770 DATA 2,1,0,2,0,1,1,0,0
1780 STOP
```


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Animated action!

***David Oxley** presents an easy program for storing several images in succession on the 48K Spectrum*

This program provides a simple method of storing 16 images in succession and has the ability to display any one image on request, or to flick through all 16 so creating an animated effect

The program achieves its high speed by using two very simple 12 byte machine code routines one to store and one to recall the displays One advantage is that no matter how long it takes to set up the displays the end results can be viewed in a matter of seconds

The program will only work on the 48K Spectrum because it uses just over 32K to store and display the images As it stands, no allowance has been made for colour, although by the addition of two more routines to store and recall the attribute bytes (22528 to 22783) this could easily be overcome

Only 16 images are allowed for, but more could be accommodated — at the cost of losing available RAM Even so, the 16 pictures still leave a 16K spectrum, 8 6K of which is not taken up by the screen nor by system variables etc A program could be designed to control the images in, for example, a mini-adventure where the top third of the screen could be used to display present whereabouts

Fed the correct data the program could simulate the movements of somebody walking across the screen, or a dramatic explosion at the end of a game The possibilities are endless given the imagination to construct the designs

Notes on the main program

Line(s)

10 to 40	Reset RAMTOP and load the machine code
50	n holds the number of the present screen
90 to 9000	Space for you to put the drawing routines

If you want to design each picture in direct mode enter the 100 STOP When you have completed the design of that screen type CONTINUE

9000 to 9030	The POKE in line 9000 sets the high byte of the DE register pair to store the n th screen in the correct place

The USR call executes the store machine code routine The screen is then cleared and if fewer than 17 screens have been counted the program continues at line 90

9100 to 9130	The FOR-NEXT loop calls up each display sequentially by POKEing and then executing the machine code
9140 to 9170	These lines simply flick through the displays in reverse order

Two short demonstration programs are also included which can simply be *Merged* into the main program and consequently run The results are quite astounding! ■

```
  10 CLEAR 32676
  20 DATA 33,64,0,17,0,64,1,0,
     8,237,176,201,17,64,0,33,
     0,64,1,0,8,237,176,201
  30 FOR n=65344 TO 66307
  40 READ a. POKE n,a  NEXT n
  50 LET n=1
  60 REM ** put your displays
     ****   after line 90
     **   90 PRINT INVERSE 0,
    OVER 0, PAPER 7, INK 0,AT
    14,0,"Present screen = ";n
9000 POKE 65358,119+8*n
9010 LET l=USR 65366
9020 CLS
9030 LET n=n+1. IF n<17 THEN
     GO TO 90
9100 FOR n=1 TO 16
9120 POKE 66348,n*8+119  LET
     l=USR 65344
9130 NEXT n
9140 FOR n=15 TO 1 STEP -1
9160 POKE 65346,n*8+119  LET
     l=USR 65344
9170 NEXT n. GO TO 9100
```

```
100 OVER 1
110 FOR a=0 TO 255 STEP n
120 PLOT a,112  DRAW 255-2*a,
    63
130 NEXT a
140 FOR a=0 TO 63 STEP n
150 PLOT 0,a+112. DRAW 255,
    63-2a
160 NEXT a
```

Demonstration 1

```
100 CIRCLE 127,143,n*2
110 CIRCLE 137-3*n,143,n
120 CIRCLE 127+3*n,143,n
130 PLOT n*4,175-2*n
140 DRAW 265-8*n,0
150 PLOT n*4,112+9*n
160 DRAW 255-8*n,0
```

Demonstration 2



Chance happening . . .

***Boris Allan** takes a look at how the Chi-squared technique can be used on BBC in social statistics*

One of the most common techniques used in social statistics (and many other branches of the subject) is that known as 'Chi-squared (pronounced "kie-squared") Basically a rectangular table of figures relating two distinct characteristics (in Table 1 voting and religion in the US) is looked at to find if there is a pattern in the figures that could not have very easily happened by chance

In Table 2 the 'expected numbers of people in each cell are shown if there was no relation between how people voted and their religion Notice that whereas one would ' expect that about 97 Protestants would vote Republican actually 29 more (ie, 126) voted in that cell

If we take the difference between the expected number and the observed number and square that number (ie 29 × 29), dividing the result by the expected number — to give a form of scaling — the result is about 8 82

If the same calculations are performed for each cell, we get Table 3 a table of "contributions", which we add up to form chi-squared Chi-squared for this set of data is 30 8557 and with this value is associated two "degrees of freedom' — that is we can choose the values for two cells, and then all the other values are fixed if we keep the row and column totals fixed

From statistical tables we see that the possibility of finding a value of chi squared as large as this *for two degrees of freedom* is so low that we can be almost certain that it did not happen merely by chance (A probability, a confidence level of 1)

The BBC Basic program listed here performs all these calculations and displays all these tables It also saves the use of statistical tables because it produces the probability level

As the program is dependent upon the use of procedures and functions, I will start from line 250 onwards before looking at the main program It might be worth remembering that the functions and procedures were written in the order in which they appear in the program *Fnprob* first, and *Procmatprint* last

Fnprob works out the probability that a value of chi squared X2 with DF degrees of freedom would have occurred by chance The formula used is an approximatiitn (but is very close) to the proper value The function uses a local variable *A* which only exists whilst the function is being called The *Rem End Fnprob* is to help in reading the listing as the function extends over more than one line

Fnformat is used to control the number of decimal places *(N)* in output of a number X — on some computers the use of the power operator is not exact, but in this case it is

Fnexp calculates an expected value for cell I J the row totals are stored as *M(I O)* the column totals as *M(O,J)* and the overall total is *M(O O,)* When the matrix of expected values is output this function is used and expected values are not stored in any matrix (to save space)

Proccontrib calculates the individual contributions, stores them in matric *M* and leaves the total in the global variadle *Chi* (the matric *M* is also global for two reasons it is not possible to have a matrix as a parameter; and it is not possible to modify the value of a parameter within a procedure and leave the parameter value modified)

Global means that it is recognised by all procedures and functions even though it is not a parameter or local variable The parameters *R C* give the number of rows and columns the local variables *I,J* are used as loop counters

Procmatin merely reads in (from DATA statements best placed at about 220) the number of rows and columns and then the elements of the tadle I use DATA statements because I find that errors are easily spotted, and therefore less errors are made

Procinit dimensions *M* to *(10 10)* which is easily altered, and inputs the title as *Titles*

Procmatprint has many parameters *T$* is the general title, *D$* is the sub-heading *R C* are as ever *Switch* is used to choose whether the raw elements are printed *(Switch=0)* or the expected values *(Switch=1)* and *Decimal* controls the number of decimal places in the figures printed Essentially, there are two simple loops and one decision (in lines 580) the local variable *A$* is used to stop the program after a table has been output

Returning to the main program (lines 110 to 180) most is now self-explanatory The portions between quotes for the *Procmatprint* calls delineate the three tables the *Mode* and *Vdu* instructions in line 110 are purely for decoration ■

TABLE 1 · OBSERVED VALUES

	Prot	RC	Jew
Votes Republican	126	61	38
Votes Democrat	71	93	69

TABLE 2 EXPECTED VALUES

	Prot	RC	Jew
Republican	96 79	75 66	52 57
Democrat	100.22	78 34	54 43

TABLE 3 CONTRIBUTIONS

	Prot	RC	Jew
Republican	8 82	2 84	4 04
Democrat	8 52	2 74	3 9

Chi-squared is 30 8556652 with 2 DoF
Probability is 1

```
L.
   10REM-----------------------------------
   20REM
   30REM
   40REM CHI-SQUARED ANALYSIS OF TABLES
   50REM
   60REM (C) BORIS ALLAN, 1983
   70REM
   80REM
   90REM-----------------------------------
  100REM-----------------------------------
  110MODE 6: VDU 19,0,4,0,0,0
  120PROCINIT
  130PROCMATIN
  140PROCMATPRINT(TITLE$,"OBSERVED",R,C,0,0)
```

```
150PROCMATPRINT(TITLE$,"EXPECTED",R,C,1,2)
160PROCCONTRIB(R,C)
170PROCMATPRINT(TITLE$,"CONTRIBUTIONS",R,C,0,2)
180PRINT''"CHI-SQUARED IS ";CHI;" WITH "(R-1)*(C-1)" DoF"''"PROBA
BILTY IS ";FN FORMAT(1-FNPROB((C-1)*(R-1),CHI),3)''''
190END
200REM-------------------------------
210REM-------------------------------
220REM PUT DATA STATEMENTS ABOUT HERE
230REM-------------------------------
240REM-------------------------------
250DEF FNPROB(DF,X2): LOCAL A
260A=2/(9*DF): A=((X2/DF)^(1/3)-1+A)/SQR(A)
270=.5/(1+A*(.196854+A*(.115194+A*(.000344+A*.019527))))^4: REM END
FNPROB
280REM-------------------------------
290REM-------------------------------
300DEF FNFORMAT(X,N)=INT(X*10^N+.5)/10^N
310REM-------------------------------
320REM-------------------------------
330DEF FNEXP(I,J)=M(I,0)*M(0,J)/M(0,0)
340REM-------------------------------
350REM-------------------------------
360DEF PROCCONTRIB(R,C): LOCAL I,J
370CHI=0: FOR I=1 TO R: FOR J=1 TO C
380M(I,J)=(M(I,J)-FNEXP(I,J))^2/FNEXP(I,J): CHI=CHI+M(I,J)
390NEXT J,I
400ENDPROC: REM CONTRIB
410REM-------------------------------
420REM-------------------------------
430DEF PROCMATIN: LOCAL I,J
440READ R,C: FOR I=0 TO 10:M(I,0)=0:  M(0,I)=0: NEXT I
450FOR I=1 TO R: FOR J=1 TO C: READ M(I,J): M(0,0)=M(0,0)+M(I,J):M
(I,0)=M(I,0)+M(I,J): M(0,J)=M(0,J)+M(I,J): NEXT J,I
460ENDPROC: REM MATIN
470REM-------------------------------
480REM-------------------------------
490DEF PROCINIT
500DIM M(10,10)
510CLS: PRINT '''"CHI-SQUARED ANALYSIS"''"DATA STATEMENTS ARE
REQUIRED"'"IF THERE ARE NONE TYPE ESC"
520INPUT "WHAT IS THE TITLE ",TITLE$
530ENDPROC: REM INIT
540REM-------------------------------
550REM-------------------------------
560DEF PROCMATPRINT(T$,D$,R,C,SWITCH,DECIMAL): LOCAL I,J,A$
570CLS: PRINT''T$;" ";D$''':FOR I=1 TO R: FOR J=1 TO C
580IF SWITCH=1 THEN PRINT FNFORMAT(FNEXP(I,J),DECIMAL); ELSE PRINT
FNFORMAT(M(I,J),DECIMAL);
590NEXT J: PRINT
600NEXT I: INPUT A$
610ENDPROC: REM MATPRINT
620REM-------------------------------
)
```

Profiled!

R Walton explains how to design a cam and draw its profile in hi-res graphics

This program should be of interest to Dragon users involved in mechanical engineering, either professionally or through technical drawing at school or college. It enables the user to calculate a cam and draw its profile in high-resolution graphics. Readers who enjoy producing graphic patterns will also find the draw routine interesting.

For those who are not familiar with the subject, a cam is a device for converting rotary motion into linear motion. It is often used in conjunction with a pivoting lever which has a roller attached to one end of it. This roller, known as the cam follower, is held onto the face of the cam by pressure from a spring and as the cam turns, 'bumps' in its profile cause the lever to move backwards and forwards.

Simple cams are often cut on a vertical milling machine using a cutter of the same diameter as the cam follower. A circular cam blank of cast-iron is mounted on the machine and the cutter is touched onto the edge. As the blank is turned through 360° (in small increments) the cutter is moved in towards the centre of the blank and back out to form the cam profile.

The profile is carefully calculated to avoid harsh and unnecessary accelerating forces, particularly at the beginning and end of the movement. This program uses one of the more basic cam forms known as Simple Harmonic Motion.

The best way to understand the program is to run it, entering the values suggested below.

STEP		VALUE
1 (Blank Dia.)	=	240
2 (Cutter Dia.)	=	38
3 (Bore Dia.)	=	38
4 (Fall)	=	F
5 (Amount)	=	60
6 (Angle)	=	60
7 (Increment)	=	2
8 (Dwell)	=	D
9 (Angle)	=	30
10 (Increment)	=	2
11 (Rise)	=	R
12 (Amount)	=	60
13 (Angle)	=	180
14 (Increment)	=	2
15 (Dwell)	=	O
16 (Angle)	=	80
17 (Increment)	=	3

On running and after answering the prompts, you will see printed tables of degrees and ordinates plotting the path of the cutter. These are stored in arrays for use in the draw routine.

When the full 360° of the profile has been calculated, the cutter should be back at its start position. The background for the drawing is now prepared — centre lines, bore and boss diameters are all plotted.

The Dragon then draws closely pitched circles around the centre of the screen representing the cutter path. The form left is the cam profile. This is not the same shape as the centre line path of the cutter due to the varying contact point between cam and cutter — and hence this method of drawing is always used for cams.

Program Notes

5-80	Sets main variables
80-180	Input for first part of cam (which cannot be a rise)
200-250	Main input section
300-360	Calculate ordinates, adjust values for drawing and store in arrays
500-550	Prompt routine for Dwell inputs
600-660	Prompt routine for Fall inputs
700-760	Prompt routine for Rise inputs
800-810	Reminder routine for current position
1000-1040	Subroutine for drawing background
2000-2040	Subroutine for circle drawing

I have used a scaling factor (X 7) in lines 70, 80 and 2020 to produce a half full size drawing on my 14" television screen. ■

```
5 REM**CAM DESIGN***
10 CLS PRINT@202,"CAM DESIGN":PRINT
   @234,"----------":PRINT@292,"(SIMPLE
   HARMONIC MOTION)":PRINT@480,"COPYRIGHT R.WALTON"
20 FOR P=1TO1500 NEXT P:CLS
30 DIM R(380),D(360),R(15):C=0:D=0:S=0
40 PRINT@34,"ALL DIMENSIONS IN MILLI
   METERS":PRINT@74,"************"
50 PRINT@98,"ENTER CAM BLANK DIAMETER"
60 PRINT@130,"(DO NOT EXCEED 250)"
   :INPUT R(S):R(S)=R(S)/2
70 PRINT@226,"ENTER CUTTER/CAM FOLL
   OWER        DIAMETER (USUALLY 25 OR
   32)":INPUT  CD:CR=CD/2*.7
80 PRINT@354,"ENTER BORE DIAMETER
   (USUALLY    25-38)":INPUT BD:BR=BD/
   2*.7
90 CLS:PRINT@37,"PROFILE CALCULATIONS"
100 PRINT:INPUT" IS FIRST SECTOR A
    DWELL(D) OR   FALL(F)";A$
105 IFA$="D"  THEN 300
108 IF A$="F"THEN 600 ELSE 90
200 CLS:PRINT@37,"PROFILE CALCULATIONS"
210 GOSUB800
220 PRINT@98,"IS  NEXT  SECTOR  A
    DWELL(D),  FALL(F) OR RISE(R)?":IN
    PUT; B$
230 IF B$="D"THEN 500
240 IF B$="F"THEN 600
250 IF B$="R"THEN 700 ELSE 200
300 CLS FOR AY=0 TO AH STEP I
310 F=INT(H/2*(1-COS(3.142*AY*(3.142/
    180)*360/(2*AH*3.142)))*1000+.5)/1000
320 R(C)=R(S)+F:D(C)=D
330 PRINT D(C) TAB(15) R(C)
340 D=D+I:C=C+1:NEXT AY
350 FOR P=1 TO 1000:NEXT P:D=D-I:C=
    C-1:S=S+1 R(S)=R(C)
360 IF D<360 THEN 200 ELSE 1000
500 CLS:PRINT@42,"**DWELL**"
510 GOSUB 800
520 H=0:PRINT@98,"ENTER ANGLE OF
    DWELL" INPUT AH
530 PRINT@226,"ENTER CUTTER
    INCREMENT":INPUT I:IF I<1 THEN530
540 FOR P=1 TO 300:NEXT P
550 GOTO 300
600 CLS:PRINT@43,"**FALL**"
610 GOSUB 800
620 PRINT@98,"ENTER AMOUNT OF FALL"
   ;INPUT H:H=-1*H
630 PRINT@226,"ENTER ANGLE OF FALL":
    INPUT AH
640 PRINT@354,"ENTER CUTTER INCRE
   MENT" INPUT I:IF I<1 THEN 640
650 FOR P=1 TO 300:NEXT P
660 GOTO 300
700 CLS:PRINT@43,"**RISE**"
710 GOSUB 800
720 PRINT@98,"ENTER AMOUNT OF RISE":
    INPUT H
730 PRINT@226,"ENTER ANGLE OF RISE":INPUT
    AH
740 PRINT@354,"ENTER CUTTER INCRE
   MENT" INPUT I:IF I<1 THEN 740
750 FOR P=1 TO 300:NEXT P
760 GOTO 300
800 IF C>0 THEN PRINT@487,"LAST ORD
    INATE = ";R(C) IF C>0 THEN PRINT@400
    "ANGLE SO FAR = ";D
810 RETURN
999 REM**BACKGROUND ROUTINE**
1000 PMODE 4,1:SCREEN 1,1:PCLS
1010 LINE(0,96)-(255,96),PSET:LINE
     (128,0)-(128,191),PSET
1020 FOR X=6TO246 STEP30:PRESET(X,96):
     PRESET(X+3,96):NEXT X
1030 FOR Y=5 TO 185 STEP 30:PRESET
     (128,Y):PRESET(128,Y+3) NEXT Y
1040 CIRCLE(128,96),BR:CIRCLE(128,96),24
2000 REM"**PROFILE DRAW ROUTINE**"
2010 FOR P=0 TO C
2020 CIRCLE(128+(R(P)*.7)*COS(D(P)*3
     .142/180),96+(R(P)*.7)*SIN(D(P)*3.
     142/180)), CR
2030 NEXT P
2040 GOTO2040
```

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the _Program of the Week_ double our new fee of £6 for each program published

Functions

on Vic20

At last! A general graph solution program for the unexpanded Commodore Vic20 which enables the user to find the solution of any real function of X (eg 2*X ↑ 3 + 3 1) and to plot its graph.

The program consists of two main sections which can be typed in separately if necessary (with some rearrangement) and which are described below. A preceding input and menu section controls program operation.

The first main section searches for and calculates the solution(s) of any function of X, and the second plots the graph of the function over an inputted range. This graph is plotted using horizontal bars (or vertical bars in special cases), although lucky programmers with memory expansion can adapt the program to plot the graph in hi-res mode.

One aspect of the program which might be of interest occurs in lines 50-60. This is a way of inputting a string and incorporating it into the program as a program line without program execution being halted (by the user). After inputting the string an appropriate number of _Returns_ are poked into the keyboard buffer (locations 631-640, code for _Return_ is 13), and the total number of characters then in the buffer is poked into location 198. Using the screen editor the lines to be entered are printed on the screen and the cursor positioned so that on program termination (occurs automatically), the _Return's_ coincide with the lines. One of the lines will be a _Run_ statement.

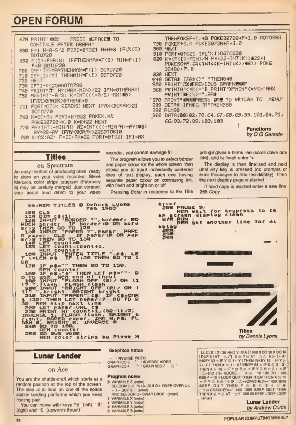
The program pays particular attention to screen format and includes full instructions. An explanation of the listing is given below.

Program notes

20-42	Input function and derivative
50-60	Incorporate above inputs into program (lines 99-101)
102 109	Menu
110-185	Search for solutions
190-214	Second menu
220-250	Calculate a solution
440-610	Input range to plot, discontinuities
620-670	Further instructions
680 720	Calculate max min
730-800	Draw axes
810-830	Draw graph
840-890	Details of previous graph

```
2 REM  SOLVE F(X)=0
4 REM COPYRIGHT O.G.GARSIDE
5 PEM HEBDEN BRIDGE,YORKSHIRE
20 PRINT"  TO SOLVE F(X)=0" PRINT"
30 PRINT"INPUT " PRINT"FUNCTION F(X) IN
   TERMSOF X" PRINT"DERIVATIVE F'(X)"
40 INPUT"F(X)",AA$ IFAA$=""THENPRINT""
   GOTO40
42 INPUT"F'(X)",BB$ IFBB$=""THENFRINT"
   " GOTO42
50 PRINT"" PRINT"99AA$=",CHR$(34),
   AA#,CHR$(34)
55 PRINT"100DEFFNA(X)="AA$ PRINT"101DEFF
   NB(X)="BB$ PRINT"RUN99"
60 FORI=1TO4 POKE630+I,13 NEXT POKE198,
   4 END
102 PRINT"MENU" PRINT"P PLOT
   GRAPH OF F(X)"
103 PRINT"S SEARCH FOR SOLUTIONSC
   CALCULATE A SOLUTION"
104 PRINT"E END"
105 GETA$ IFA$<>"C"ANDA$<>"S"ANDA$<>"P"
   ANDA$<>"E"THEN105
106 IFA$="E"THENEND
107 IFA$="P"THEN450
108 IFA$="C"THEN220
109 IFA$="A"THEN300
110 PRINT"GIVE RANGE OF VALUES  OF X TO
   SEARCH FOR    SOLUTIONS."
111 PRINT"F(X) MUST BE CONTINU- OUS IN
   THIS RANGE."
120 INPUT"X>=",A INPUT"X<=",B IFA>=B
   THEN109
125 J=10
130 PRINT"RANGE   "A"< X <"B PRINT"
   SEARCHING" F=0
140 S=(B-A)/J PRINT"SIEVE WIDTH"S PRINT
150 FORX=ATOBSTEPS Y=X+S
160 IFABS(FNA(X))<=ABS(X)*10↑-9THENPRINT"
   SOLUTION X=",X F=1 GOTO185
170 IFABS(FNA(Y))<=ABS(X)*10↑-9THEN185
180 IFSGN(FNA(X))*SGN(FNA(Y))<0THENPRINT
   INT(1E7*-X)/-1E7"<SOLUTION<"INT(1E7*-Y)
   /-1E7 F=1
185 NEXT IFF=0THENPRINT"NO SOLUTIONS
   FOUND"
190 PRINT"F REPEAT WITH FINER     SIEVE"
200 PRINT"R TRY ANOTHER RANGE"
205 PRINT"C CALCULATE A SOLUTION"
206 PRINT"M RETURN TO MENU"
210 GETA$ IFA$<>"M"ANDA$<>"C"ANDA$<>"R"
   ANDA$<>"F"THEN210
211 IFA$="F"THENJ=J*10 GOTO130
212 IFA$="R"THEN109
214 IFA$="M"THENRUN99
220 PRINT"APPROXIMATE SOLUTION "
   INPUT"X=",X PRINT
230 IFABS(FNB(X))<=ABS(X)*10↑-9THENPRINT"
   STATIONARY VALUE ATX=",X"" GOTO200
240 IFABS(FNA(X)/FNB(X))>ABS(X*10↑-9)
   THENX=X-FNA(X)/FNB(X) GOTO230
250 PRINT"SOLUTION X=",X PRINT"" GOTO200
415 RUN99
440 REM GRAPH PLOT
450 SC=7680
460 DIMF(21),L%(21),C%(7)
480 PRINT"GIVE THE RANGE OF     VALUES OF
   X TO PLOT"
490 INPUT"X>=",A
500 INPUT"X<=",B PRINT IFA>=BGOTO480
510 S=(B-A)/22
520 PRINT"GIVE THE NUMBER OF DISCONTINUI
   TIES IN THE" INPUT"RANGE",A%
530 IFA%<0GOTO520
540 IFA%=0GOTO610
550 PRINT"AT WHAT VALUE", IFA%>1THEN
   PRINT"S",
560 PRINT" OF X?"
570 FORI=1TOA%
580 INPUT"X=",K IFK<BANDK>=ATHENL%(INT(
   (K-A)/S))=1
590 NEXT
600 PRINT"" FORI=0TO7 READC%(I) NEXT
610 PRINT"" FORI=0TO7 READC%(I) NEXT
620 PRINT"    PLEASE WAIT."
630 PRINT"  F(X)=",AA$
640 PRINT"THE GRAPH IS PLOTTED  USING
   HORIZONTAL BARS - THE MID-POINT OF THE"
650 PRINT"BAR GIVING AN ACCURATEPLOT." K=TI
```

Continued over the page



```
670 PRINT"    PRESS SPACE TO
    CONTINUE AFTER GRAPH"
680 F=1 H=A-S/2 FORI=0TO21 N=H+S IFL%(I)
    GOTO720
690 F(I)=FNA(N) IFFTHENMAX=F(I) MIN=F(I)
    F=0 GOTO720
700 IFF(I)>MAXTHENMAX=F(I) GOTO720
710 IFF(I)<MI THENMIN=F(I) GOTO720
720 NEXT
730 IFTI-K<250GOTO730
740 PRINT"" H=(MAX-MIN)/22 IFN=0THENH=1
750 AX=INT(-A/S) K=INT(((-A/S)-AX)*8)
    IFAX>0ANDK>0THENK=0
751 FORI=0TOK READX%: NEXT IFAX<0ORAX>21
    GOTO770
760 K=SC+AX FORI=0TO22 POKEK,X%
    POKE30720+K,0 K=K+22 NEXT
770 AY=INT(-MIN/H) AZ=INT(((-MIN/H)-AY)*8)
    AY=22-AY IFAY<0ORAY>22GOTO810
780 K=C%(AZ) F=SC+AY*22 FORI=0TO21 IFI=AX
    THENPOKEF+I,48 POKE30720+F+I,0 GOTO800
790 POKEF+I,K POKE30720+F+I,0
800 NEXT
810 FORI=0TO21 IFL%(I)GOTO830
820 K=(F(I)-MIN)/H P=(22-INT(K))*22+I
    POKESC+P,C%(INT((K-INT(K))*8)) POKE
    38400+P,0
830 NEXT
840 GETA$ IFA$<>" "THEN840
850 PRINT"PREVIOUS GRAPH"
860 PRINTA"<=X<="B PRINT"MIN"<=Y<="MAX
    PRINT"F(X)=",AA$
870 PRINT"PRESS M TO RETURN TO  MENU"
880 GETA$ IFA$<>"M"THEN880
890 RUN99
900 DATA100,82,70,64,67,68,69,99,101,84,71,
    66,93,72,89,103,103
```

Functions
by O G Garside

Titles

on Spectrum

An easy method of producing titles ready to store on your video recorder. Steve Mercer's color strips program (February 3) may be usefully merged. Just connect your serial lead direct to your video recorder, you cannot damage it!

The program allows you to select border and paper colour for the whole screen then allows you to input individually centered lines of text display, each one having separate paper colour on contrasting ink, with flash and bright on or off.

Pressing *Enter* in response to the Title prompt gives a blank line (scroll down one line), and to finish enter '*'.

The display is then finalised and held until any key is pressed (no prompts or error messages to mar the display). Then the next display page is started.

If hard copy is wanted enter a new line 265 *Copy*.

```
  99 REM TITLES © Dennis Lyons
                 Feb 1983
 100 CLS
 110 DIM c$(1)
 120 INPUT "BORDER ?",border: BO
RDER border: IF border<0 OR bord
er>9 THEN GO TO 120
 130 INPUT "PAPER ?",paper: PAPE
R paper: CLS : IF paper<0 OR pap
er>9 THEN GO TO 130
 140 LET count=0
 150 LET count=count+1:
     REM counter
 160 INPUT "ENTER TITLE ",p$: LE
T l=LEN p$: IF l>30 THEN GO TO 1
60
 170 IF p$="" THEN GO TO 150:
     REM counter
 180 IF p$="*" THEN LET p$="": G
O TO 250: REM end of input
 190 INPUT "FLASH OFF (0)/ ON (1
)? ",flash: FLASH flash
 200 INPUT "BRIGHT OFF (0)/ ON (
1)? ",bright: BRIGHT bright
 210 INPUT "PAPER" c$: IF c$=CHR
$ (32) THEN LET paper=7: GO TO 2
30: REM skip next line
 220 LET paper=VAL c$
 230 PRINT AT count+1,(32-l)/2;
INVERSE 1; FLASH flash; BRIGHT b
right; PAPER paper; INK 9;p$; FL
ASH 0; BRIGHT 0; INVERSE 0
 240 GO TO 150
     REM counter
 250 GO SUB 9500:
     REM color strips by Steve M
ercer
 260 PAUSE 0:
     REM wait for keypress to ke
ep screen display clean
 270 RUN
     REM get another line for di
splay
 280
 290
 299
```

Titles
by Dennis Lyons

Lunar Lander

on Ace

You are the shuttle-craft which starts at a random position at the top of the screen. The idea is to land on one of the space station landing platforms which you keep floating past.

You can move with keys "5" (left) "8" (right) and "6" (upwards thrust).

Graphics notes

– / INVERSE VIDEO
GRAPHICS 3 / INVERSE VIDEO
GRAPHICS 4 / GRAPHICS 7 △

Program notes

0 VARIABLE S (enter)
SEEDON 3 @ 75 U* 75 0 D+ OVER OVER U< – 1– DUP S ! (enter)
RND SEEDON U* SWAP DROP (enter)
1 VARIABLE X (enter)
1 VARIABLE Y (enter)
0 VARIABLE A (enter)
0 VARIABLE B (enter)

```
LL CLS 1 X ! 30 RND Y ! 0 A ! 1000 0 DO 30 0 DO 10
) DUP B ! AT  △⌐  X @ Y @ AT  △△  A @ 1+ A !
INKEY 53 = IF Y @ 1– Y ! THEN INKEY 56 – IF Y @
1+ Y ! THEN X @ 1+ X ! INKEY 54 = IF X @ 2  X !
THEN X @ 10 = IF Y @ B @ > IF Y @ B @ 3 + < IF
 △•DID IT!• SCORE  A @ 10 100 DO I 100
BEEP –10 +LOOP QUIT THEN THEN THEN X @ 19
= IF Y @ B @ 1+ IF  △••CRASHED••" 450 1000
BEEP QUIT THEN Y @ B @ 3 + > IF
 △••CRASHED••" 450 1000 BEEP QUIT THEN
THEN X @ Y @ AT  △Y" 300 60 BEEP LOOP LOOP
(enter)
```

Lunar Lander
by Andrew Curtis

Rock Attack

on Spectrum

You are the commander of a starship returning to earth from your travels to other galaxies.

Your mission is nearly complete and only the asteroid field lies between you and earth. As you manoeuvre through the large rocks you notice one asteroid on the edge of your screen lumbering towards you. Using your controls you must turn and fire or thrust to avoid the rock.

Your task has been allotted so using the keys indicated in the instructions you must save your ship. Just to make things even harder if you clear a screen you must start again at a new position on the screen.

```
1 REN  ##### ROCK ATTACK #####
2 REN  ##                    ##
3 REM  ## BY  JAMES HURRELL  ##
4 REM  ## & DARREN WALKER    ##
5 REM  ########################
7 BORDER 0 PAPER 0 CLS
10 FOR V=1 TO 15
20 READ A$
30 FOR C=0 TO 7
40 READ A
50 POKE USR A$+C,A
60 NEXT C
70 NEXT V
80 PRINT INK 5, BRIGHT 1; AT 0,10;"ROCK ATTACK"
81 PRINT AT 1,9;"___________"
82 PRINT AT 4,13  FLASH 1 "ALERT"  AT 5,8 "ASTEROIDS AHEAD"
100 PRINT '''         '1'...ROTATE LEFT
   '3'...ROTATE RIGHT'
101 PRINT "        '9' . THRUST                  '0'  .FIRE"
102 PLOT INK INT(RND*6)+1,RND*255,RND*175
103 IF INKEY$=""THEN GOTO 102
115 CLS
120 LET S=0 LET L=3
130 LET B=15 LET A=10 LET A$="ABCDEFGH" LET C=1 LET L$="PPP"
140 LET A1=1 LET B1=2 LET X1=2 LET A2=1 LET B2=29 LET X2=2
   LET A3=19 LET B3=30
148 LET X3=2 LET A4=14 LET B4=0 LET X4=2
150 PRINT BRIGHT 1 INK 7, AT A,B B$(C)
158 INK 6
160 IF X1=1 THEN PRINT BRIGHT 1, AT A1,B1 "I"
162 IF X1=2 THEN PRINT BRIGHT 1  AT A1-1,B1-1;"JKL";
   AT A1 B1-1 "MNO"
166 IF X2=1 THEN PRINT BRIGHT 1  AT A2 B2;"I"
167 IF X2=2 THEN PRINT BRIGHT 1, AT A2-1 B2-1 "JKL"
   AT A2 B2-1 "MNO"
168 IF X3=1 THEN PRINT BRIGHT 1; AT A3 B3 "I"
169 IF X3=2 THEN PRINT BRIGHT 1; AT A3-1 B3-1 "JKL"
   AT A3 B3-1 "MNO"
170 IF X4=1 THEN PRINT BRIGHT 1  AT A4,B4 "I"
171 IF X4=2 THEN PRINT BRIGHT 1  AT A4-1 B4-1 "JKL"
   AT A4 B4-1 "MNO"
175 PRINT AT 0,14 S, AT 0 0 L$( TO L)
180 IF ATTR (A,B)=70 THEN GO TO 4000
200 LET A$=INKEY$
210 IF B$="1" THEN GO SUB 1000
220 IF B$="3" THEN GO SUB 1020
230 IF B$="9" THEN BEEP .01 -20 GO SUB C*500+500
240 IF B$="0" THEN BEEP .01 20 GO SUB C*10+2000
250 IF X1=1 OR X2=2 THEN LET A1=A1+1 LET B1=B1+1
251 IF B1=30 THEN LET B1=1
252 IF A1=20 THEN LET A1=2
253 IF X2=1 OR X2=2 THEN LET A2=A2+1 LET B2=B2-1
254 IF A2=20 THEN LET A2=2
255 IF B2=1 THEN LET B2=30
256 IF X3=1 OR X3=2 THEN LET A3=A3-1 LET B3=B3-1
257 IF A3=2 THEN LET A3=20
258 IF B3=1 THEN LET B3=30
259 IF X4=1 OR X4=2 THEN LET A4=A4-1 LET B4=B4+1
260 IF A4=2 THEN LET A4=20
261 IF B4=30 THEN LET B4=1
500 CLS
510 GOTO 150
504 LET B=B-1 IF B=0 THEN LET B=31
505 RETURN
508 LET A=A-1 LET B=B-1 IF A=21 THEN LET A=0
509 IF B=0 THEN LET B=31
510 RETURN
512 LET A=A-1 IF A=21 THEN LET A=0
513 RETURN
516 LET A=A+1 LET B=B+1 IF A=21 THEN LET A=0
517 IF B=31 THEN LET B=0
518 RETURN
520 LET B=B+1 IF B=31 THEN LET B=0
521 RETURN
524 LET A=A-1 LET B=B+1 IF A=0 THEN LET A=21
525 IF B=31 THEN LET B=0
526 RETURN
528 LET A=A-1 IF A=0 THEN LET A=0
529 RETURN
532 LET A=A-1 LET B=B-1 IF A=0 THEN LET A=21
533 IF B=0 THEN LET B=31
534 RETURN
1000 LET C=C+1 IF C=9 THEN LET C=1
1010 RETURN
1020 LET C=C-1 IF C=0 THEN LET C=8
1040 RETURN
2010 FOR F=B-1 TO 0 STEP -1 LET F=A
2011 PRINT AT 0,F " "
2012 IF ATTR (0 F-1)=70 THEN GO TO 4000
2013 NEXT F
2014 RETURN
2020 LET B=B+1
2021 FOR F=B-1 TO 0 STEP -1
2022 PRINT AT 0 F "."
2023 IF ATTR (0+1 F-1)=70 THEN GO TO 4000
2024 LET O=O+1 IF O=21 THEN RETURN
2025 NEXT F
2026 RETURN
2030 FOR O=A+1 TO 21 LET F=B
2031 PRINT AT O,F "."
2032 IF ATTR (O+1 F)=70 THEN GO TO 4000
2033 NEXT O
2034 RETURN
2040 LET O=A+1
2041 FOR F=B+1 TO 31
2042 PRINT AT O,F,"."
2043 IF ATTR (O+1 F+1)=70 THEN GO TO 4000
2044 LET O=O+1 IF O=21 THEN RETURN
2045 NEXT F
2046 RETURN
2050 FOR F=B+1 TO 31 LET O=A
2051 PRINT AT O,F "."
2052 IF ATTR (O F+1)=70 THEN GO TO 4000
2053 NEXT F
2054 RETURN
2060 LET O=A-1
2061 FOR F=B+1 TO 31
2062 PRINT AT O F "."
2063 IF ATTR (O-1 F+1)=70 THEN GO TO 4000
2064 LET O=O-1 IF O=0 THEN RETURN
2065 NEXT F
2066 RETURN
2070 FOR O=A-1 TO 0 STEP -1 LET F=B
2071 PRINT AT O F "."
2072 IF ATTR (O-1 F)=70 THEN GO TO 4000
2073 NEXT O
2074 RETURN
2080 LET O=A-1
2081 FOR F=B-1 TO 0 STEP -1
2082 PRINT AT O F;"."
2083 IF ATTR (O-1,F-1)=70 THEN GO TO 4000
2084 LET O=O-1 IF O=0 THEN RETURN
2085 NEXT F
2086 RETURN
3000 DATA "A" 0 12 30 100 190 50 15 3 "B" 16 16 40 44,87,70
   170 192
3001 DATA "C" 190 180 98 68 86 38 24 24,"D" 0,0,29 52,194,
   50 12 3
3002 DATA "E" 192,176 76 35 60 76 178 192 "F",0,10,50 194,50
   20 0 0
3003 DATA "G" 24 24 36 36 00 00 165 195 "H" 192 170,70 67 44
   40 16 10
3004 DATA "I",54,70 60 100 129 85 62 44,"J" 0 0 1 2 2 2 2 4
3005 DATA "K" 0 0 252 0 1 2 0 0 "L" 0 0 0 0 0,0,100 128 90
3006 DATA "M" 0 0,16 8 0 7 0,0 "N" 0 0 0 0 0,0 128 64 63 "O",
   16 0 0 0 0 0 16 224
4000 IF F+1=B1 OR F-1=B1 OR F=B1 OR F+2=B1 OR F-2=B1
   THEN GO SUB 7000
4001 IF F+1=B2 OR F-1=B2 OR F=B2 OR F+2=B2 OR F+2=B2
   THEN GO SUB 7010
4002 IF F+1=B3 OR F-1=B3 OR F=B3 OR F+2=B3 OR F-2=B3
   THEN GO SUB 7020
4003 IF F+1=B4 OR F-1=B4 OR F=B4 OR F+2=B4 OR F-2=B4
   THEN GO SUB 7030
4005 LET S=S+10
4006 CLS
4010 IF X1<=0 AND X2<=0 AND X3<=0 AND X4<=0 THEN GOTO 5000
4100 GO TO 150
5000 RANDOMIZE
5003 LET A=INT (RND*21) LET B=INT (RND*31) LET C=INT (RND*7)+1
5010 GO TO 140
6000 FOR T=1 TO 8 PRINT AT A B;A$(T) BEEP .2 -10 NEXT T
6010 PRINT AT A-1 B-1 "/A\";AT A B-1,"(B)" AT A+1 B-1 "\A/"
   PAUSE 100
6020 LET L=L-1 IF L=0 THEN CLS PRINT AT 10,11 "GAME OVER" AT 0 0
   " " PAUSE 100 GOTO 80
6030 GO TO 130
7000 IF O=A1 OR O-1=A1 OR O+1=A1 OR O+2=A1 OR O-2=A1
   THEN LET X1=X1-1
7005 RETURN
7010 IF O=A2 OR O-1=A2 OR O+1=A2 OR O+2=A2 OR O-2=A2
   THEN LET X2=X2-1
7015 RETURN
7020 IF O=A3 OR O-1=A3 OR O+1=A3 OR O+2=A3 OR O-2=A3
   THEN LET X3=X3-1
7025 RETURN
7030 IF O=A4 OR O-1=A4 OR O+1=A4 OR O+2=A4 OR O-2=A4
   THEN LET X4=X4-1
7035 RETURN
```

Rock Attack
by James Hurrell

Unseasonal Greetings

on BBC Micro

This display program was written to show features available in BBC mode 7 and to illustrate some disadvantages The program displays a Christmas tree and under the control of a 20-second *Inkey* adds various other graphics and ends with 'Jingle Bells on three sound channels

The program consists of three parts, a main stem from 10 to 190, *Progs* from 200 to 690 and data for the music from 700 to end.

Procl draws the left-hand branches in green (*Chr$* 146) in non-contiguous graphics (to give a fir tree effect) using character 238 Note the backwards loop Since the characters are drawn one at a time, L times then an increasing loop would put a graphics control character on top of the already printed graphic character thereby rubbing it out — a very awkward feature of mode 7 graphics

Procr draws the right hand branches, but does not need the graphics characters 146 and 154 because the line has already been set to these by *Procl*

Proct draws the trunk and *Procb* the box Note again the backwards loop in *Procb* You can try looping it forwards from 1 to 8 (at line 340) The remaining *Proc*'s put on candles, floor, presents and music.

Note that at line 430 non-contiguous graphics is selected for the candles and the use of VDU as an equivalent alternative to *Printchr$*

In mode 7 it is not easily possible to have two coloured graphics next to each other because of the screen space occupied by the graphics colour character

In *Procp* a white ribbon on a blue present is achieved by printing the blue in the background with the white as foreground on top

```
 10 REM XMAS [redacted]
 20 REM V02 13.11.82
 30 MODE7
 35 '&FE00=&10200A
 40 *TV255
 50 DIMP(4),D(4)
 60 FOR B=2 TO 16 STEP 2
 70 PROCL
 80 PROCR
 90 PROCT
100 HEXT B
110 FOR B=16 TO 18:PROCT:NEXT B
120 FOR B=20 TO 23:PROCB:NEXT B
160 W=INKEY(100)
170 PRINTTAB(16,1)CHR$136CHR$131"**"
172 WAIT=INKEY(2000):PROCC
174 WAIT=INKEY(2000):PROCF
176 WAIT=INKEY(2000):PROCP
178 WAIT=INKEY(2000):PROC61
180 WAIT=INKEY(2000)
190 CLS:GOTO60
200  DEFPROCL
210 FOR L=1 TO B
220  PRINTTAB(17-L,B)CHR$154CHR$146
     CHR$238
230 NEXT L
240  ENDPROC
250  DEFPROCR
260 FOR R=1 TO B
270  PRINTTAB(18+R,B)CHR$189
280 NEXT R
290  ENDPROC
300  DEFPROCT
310  PRIHTTAB(16,B+1)CHR$154CHR$146
     CHR$234CHR$181
320  ENDPROC
330  DEFPROCB
340 FOR Z=8 TO 1 STEP -1
350  PRINTTAB(13+Z,B)CHR$145CHR$230
360 NEXT Z
370  ENDPROC
380  DEFPROCC
390  X=16
400 FOR Z=3 TO 15 STEP 2
410  X=X-Z
420 PRINTTAB(X,Z);CHR$147CHR$234:
    VDU146
430 PRINTTAB(34-X,Z);:VDU153:PRINT
    CHR$147CHR$181
440  NEXTZ
450 ENDPROC
460  DEFPROCF
470  PRINTTAB(0,23)CHR$145CHR$157
480  ENDPROC
490  DEFPROCP
500  PRINTTAB(7,21)CHR$151CHR$252
    CHR$252CHR$252CHR$252
510  PRINTTAB(6,22)CHR$147CHR$255
    CHR$255CHR$9CHR$149CHR$255CHR
    $255
520  PRINTTAB(26,21)CHR$150CHR$157
    CHR$151CHR$9CHR$181CHR$9CHR$9
    CHR$9CHR$156
530 PRINTTAB(26,22)CHR$150CHR$157
    CHR$151CHR$9CHR$181CHR$9CHR$9CHR
    $9CHR$156
540  PRINTTAB(27,20)CHR$151CHR$168
    CHR$249CHR$248CHR$183
550  ENDPROC
560 DEFPROCB1
570 RESTORE
580FORT=1TO 56
600FORL=1 TO 3
610SOUNDL,0,0,1
620 READ P(L),D(L)
630IFP(L)=0 THEN SOUNDL,0,0,D(L):
    GOTO650
640 SOUNDL,-15,P(L),D(L)
650IFD(L)=6THENSOUNDL,0,0,2.5
660IFD(L)=7THENSOUNDL,0,0,15
670NEXTL
680 NEXTT
690 ENDPROC
700DATA145,5,129,5,0,5,145,5,129,5,0,
    5,145,10,129,10,0,10,145,5,129,
    5,0,5,145,5,129,5,0,5,145,10,129,
    10,0,10
710DATA145,5,0,5,0,5,157,5,0,5,0,5,
    129,7.5,0,7.5,0,7.5,137,2.5,0,2.5,
    0,2.5,145,7.5,129,7.5,0,7.5,0,5,0,
    ,5,0,5
720DATA149,5,129,5,127,5,149,5,129,5,
    127,5,149,7.5,129,7.5,127,7.5,149,
    2.5,0,2.5,0,2.5,149,5,127,5,0,5,
```

```
  145,5,109,5,0,5,145,5,109,5,0,5,
  145,2.5,129,2.5,0,2.5,145,2.5,129,
  2.5,0,2.5
730DATA145,5,129,5,0,5,137,5,0,5,0,5,
  137,5,0,5,0,5,145,5,0,5,0,5,137,5,
  125,5,0,5,157,5,0,5,0,5,149,5,0,5,
  0,5,137,5,0,5,0,5
740DATA145,5,129,5,0,5,145,5,129,5,0,
  5,145,10,129,10,0,10,145,5,129,5,
  0,5,145,5,129,5,0,5,145,10,129,10,
  0,10
750DATA145,5,0,5,0,5,157,5,0,5,0,5,
  129,7.5,0,7.5,0,7.5,137,2.5,0,2.5,
  0,2.5,145,7.5,129,7.5,0,7.5,0,5,0,
  5,0,5
760 DATA149,5,129,5,117,5,149,5,129,5,
  117,5,149,7.5,129,7.5,117,7.5,149,
  2.5,0,2.5,0,2.5,149,5,117,5,0,5,
  145,5,109,5,0,5,145,5,109,5,0,5,
  145,2.5,129,2.5,109,2.5,145,2.5,
  129,2.5,109,2.5
770DATA157,5,125,5,0,5,157,5,0,5,125,
  5,149,5,125,5,0,5,137,5,125,5,0,5,
  129,5,0,5,0,5,0,5,0,5,0,5
```

Unseasonal greetings
by S G Poulton

Fly

on Spectrum

Instructions for this game are in the program

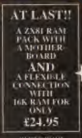
Enter lines 1 to 17 (set up user-definadle graphics) then *Run* this to allow the graphics to be established

Program notes

Lines	
10 to 51	Sets up variables.
60 70 110 and 120	Are responsible for printing the graphics Although these are written out in full on the listing in practice the Spectrum has to be put into Graphics mode and the appropriate letter entered.
130	Checks if the Fly has been caught.
260 to 9030	Deal with the end of the game and the instructions.

```
1 REM FLY (C) C.LAWSON 6/2/1983
2 DAYA 0,43,120,205,7,1,2,6
3 FOR F=0 TO 7: READ T: POKE USR
  "a"+F,T: NEXT F
4 DATA 0,24,60,230,128,128,64,96
5 FOR F=0 TO 7: READ T: POKE USR
  "b"+F,T: NEXT F
6 DATA 0,1,2,28,32,28,1,0
7 FOR F=0 TO 7: READ T: POKE USR
  "c"+F,T: NEXT F
8 DATA 60,194,1,95,130,95,1,254
9 FOR F=0 TO 7:READ T: POKE USR
  "d"+F,T: NEXT F
10 DATA 0,24,32,64,192,128,0,0
11 FOR F=0 TO 7:READ T:POKE USR
  "e"+F,T:NEXT F
12 DATA 0,0,0,7,13,27,10,6
13 FOR F=0 TO 7:READ T:POKE USR
  "f"+F,T: NEXT F
14 DATA 0,0,0,224,160,116,72,96
15 FOR F=0 TO 7: READ T: POKE USR
  "g"+F,T: NEXT F
16 DATA 192,113,126,4,12,50,97,192
17 FOR F=0 TO 7: READ T: POKE USR
  "h"+F,T:NEXT F
18 LET H=99
19 LET C=0
20 LET J=3
30 LET K=15
40 LET X=0
50 LET Y=0
51 LET M=100
54 PRINT AT 10,6;"DO YOU WANT INSTRUC
  TIONS?":INPUT A$:
IF A$="y"OR A$="yes"THEN GOSUB 9000: CLS
55 BEEP .5,0:BEEP .5,0:BEEP .25,1:
  BEEP .1,5: BEEP .01,4:BEEP .1,3:BEEP
  .01,2:BEEP .5,1
60 PRINT AT Y,X;"(user definable a,b)"
70 PRINT AT J,K;"(user definable c,
  d,e)"
80 GOSUB 100
90 IF INKEY$<>"" THEN GOSUB 230
100 CLS
110 PRINT AT Y,X;"(user definable f,
  g)"
120 PRINT AT J,K;"(user definable h)"
130 IF INT (X+.5)=K-1 AND (Y+.5)=J
  THEN GOTO 260
140 GOSUB 180
150 CLS
160 LET C=C+1:IF C>=M THEN PRINT AT
  8,2;"YOU HAVE DIED OF STARVATION":
  PAUSE 100:GOTO 260
170 GOTO 60
180 LET X=ABS (X+4*RND-2)
190 LET Y=ABS (Y+2*RND-1)
200 IF ABS X>20 THEN LET X=20
210 IF ABS Y>8 THEN LET Y=8
220 RETURN
230 LET K=K+(INKEY$="8" AND K<20)-
  (INKEY$="5" AND K>0)
240 LET J=J+(INKEY$="6" AND J<8)-
  (INKEY$="7" AND J>0)
250 RETURN
260 IF H>C THEN LET H=C
270 PRINT AT 21,0;INK 1;"TIME TAKEN=";
  C; AT 21,15;"HI-SCORE=";H
280 PRINT AT 14,8;"DO YOU WANT
  ANOTHER GO ?";INPUT A$:IF
  A$="y" OR A$="yes" THEN GOTO 19
290 STOP
9000 CLS: PRINT AT 0,10;INK 1;"THE
  FLY":OVER 1:
PRINT AT 0,9;"(9# symbol shift 0)"
9010 PRINT AT 2,2;"You have been
  transformed into":PRINT:
PRINT "a rare bird & have been
  placed ":
PRINT:PRINT "on an island where food
  is        ":PRINT:
PRINT"scarce.You have found a juicy
  ":PRINT:
PRINT "fly,but it is smart and
  dodges
9015 PRINT:PRINT "you.Using the
  cursor keys steer ":PRINT:
PRINT "yourself to a feast!"
9020 PRINT:PRINT "  However you only
  have a limit":PRINT:
PRINT "-ed amount of energy.Therefore
  ":PRINT:
PRINT "you are racing against time!"
:PRINT AT 21,8;"GOOD LUCK":
OVER 1:PRINT AT 21,7;"(11#symbol
  shift 0)"
9030 PAUSE 1500:RETURN
```

Fly
by Carlton Lawson



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Targat

on Spectrum

In this program you are in command of a missile firing base and it is your job to stop the enemy from landing on earth. The aliens will appear at a random position on the screen. Your sight starts in the centre, position it over the enemy ship and press the 0 key to fire your laser. If you hit it a victory roll is played and another ship will appear. This goes on until your time is up (you have two minutes).

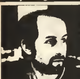
Both your score and time are displayed on the screen throughout the game.

Program notes

1-40	Set up variables
100-999	Main loop
1000-1060	Subroutine for if you press a key
2000-2050	Subroutine for if you
3000-3090	Subroutine to move alien
4000-4020	Subroutine for if you hit an alien
5000-5210	Subroutine to set up user defined graphics
6000-6310	Time up routine
7000-7300	Instructions

```
   1 LET h=0
   5 LET s=0
  10 GO SUB 5000
  15 GO SUB 7000
  16 POKE 23674,0
  17 POKE 23673,0
  18 POKE 23672,0
  20 INK 0: PAPER 4: BORDER 2:
     CLS
  30 LET b=1
  40 LET x=15: LET y=15
  50 GO SUB 2000
  60 GO SUB 3000
 100 IF INKEY$<>"" THEN LET
     a$=INKEY$: GO SUB 1000
 105 LET b=2
 110 IF RND;c*.17 THEN GO SUB
     3020
 120 IF INKEY$="0" THEN BEEP
     .2,30: IF x1=x AND y1=y
     THEN GO TO 4000
 150 LET t=INT (((PEEK 23673)
     *5)+((PEEK 23672)/50))
 160 PRINT AT 0,0; INVERSE 1;
     "SCORE=";s
 170 IF t=100 THEN FLASH 1
 180 PRINT AT 0,18;"TIME LEFT
     =";120-t;" SECONDS "
 200 IF 120-t<=0 THEN GO TO
     B000
 999 GO TO 180
1000 GO SUB 2000
1010 IF a$="8" AND y<29 THEN
     LET y=y+1
1020 IF a$="7" AND x>1 THEN
     LET x=x-1
1030 IF a$="6" AND x<19 TNEN
     LET x=x+1
1040 IF a$="5" AND y>2 THEN
     LET y=y-1
1050 GO SUB 2000
1060 RETURN
2000 OVER 1
2010 PRINT AT x-1,y;"C"
2020 PRINT AT x,y-1;"B B"
2025 PRINT AT x+1,y;"C"
2030 OVER 0
2050 RETURN
3000 LET x1=INT (RND*19+1)
3010 LET y1=INT (RND*29+1)
3015 IF b=1 THEN GO TO 3030
3020 PRINT OVER 1;AT x1,y1;"A"
3030 LET v=INT (RND*4)+1
3040 IF v=1 AND x1>4 THEN LET
     x1=x1-1
3050 IF v=2 AND x1<18 THEN LET
     x1=x1+1
3060 IF v=3 AND y1>3 THEN LET
     y1=y1-1
3070 IF v=4 AND y1<28 THEN LET
     y1=y1+1
3080 PRINT OVER 1;AT x1,y1;"A"
3090 RETURN
4000 FOR j=-30 TO 50: BEEP .03,
     j: NEXT j
4010 LET s=s+10
4020 GO TO 20
5000 POKE USR "a",66
5010 POKE USR "a"+1,153
5020 POKE USR "a"+2,189
5030 POKE USR "a"+3,255
5040 POKE USR "a"+4,255
5050 POKE USR "a"+5,189
5060 POKE USR "a"+6,153
5070 POKE USR "a"+7,66
5100 FOR l=0 TO 7: POKE USR
     "c"+l,24: NEXT l
5200 FOR l=0 TO 7: POKE USR
     "b"+l,0: IF l=3 OR l=4
     THEN POKE USR "b"+l,255
5210 NEXT l
5300 RETURN
6000 DATA 0,6,9,15,9,6,0
6010 LET y=.001
6020 FOR n=-20 TO 40 STEP 5:
     RESTORE
6030 FOR k=1 TO 7: BORDER k:
     READ x: BEEP .04,x+n
6040 NEXT k: NEXT n: BEEP 2,
     0+n-1
6050 FOR n=40 TO -20 STEP -3:
     RESTORE
6060 FOR k=1 TO 4: BORDER k:
     READ x: BEEP .04,x+n
6070 NEXT k: LET y=y+0.002:
     NEXT n
6090 PAUSE 160
6100 CLS
6110 IF s>h THEN LET h=s: PRINT
     "CONGRATULATIONS YOU HAVE
     GOT THE HIGHEST SCORE
     TODAY OF ";h
6200 PRINT FLASH 1;"DO YOU
     WANT ANOTHER GAME (y/n)"
6300 IF INKEY$="" THEN GO TO
     6300
6310 IF INKEY$="y" THEN GO TO
     5
7000 PRINT TAB 10;"INSTRUTIONS"
7010 PRINT
7020 PRINT "The idea of the
     game is to shoot down as
     many aliens (A) as you
     can in 2 minutes "
7030 PRINT
7040 PRINT TAB 12;"CONTROLS"
7050 PRINT
7060 PRINT "Use the cursor
     keys(5,6,7,8) to move
     your sight around and the
     0 key to fire"
7070 PRINT
7080 PRINT "PRESS ANY KEY TO
     CONTINUE"
7090 PAUSE 0
7095 CLS
7100 INPUT "ENTER SKILL LEVEL
     (1 TO 5 ,5 EASY)";c
7300 CLS : RETURN
```

Terget
by Robert Kirkland



Three golden rules . . .

Now we are getting to the nitty gritty of Adventuring! You have just purchased your latest adventure tape and loaded it into the computer — you are staring at the screen wondering how to answer the first prompt.

Most programs of the traditional text variety will describe the location which is usually outside a hut on the edge of a forest outside a castle or some other variation Next comes the prompt "What shall I do next? Your first reaction may well be to instruct the computer to dash off into the surrounding landscape — you naturally want to get your hands on all that lovely Treasure or fight Dragons *Don't!* Almost without exception that building, hut castle spaceship or whatever it is in the opening preamble is there for a purpose

This is the first golden rule of computer adventuring *Nothing exists without a purpose* Memory space is too tight to allow objects to just sit there without contributing something to the game (although I often wonder what use the Golden Key, in the Hobbit, can be put to)!

So, enter the building, or whatever it is at the start. It's a good bet that if the author has written a traditional monster-bashing fantasy you will find a sword, or other weapon, and food and drink. You may be tempted, at this point, to eat and drink — OK but remember our first golden rule and don't discard the empty containers You may bet your last gold piece that they will be needed later in your adventure (and we will have a look later at one particularly clever use that these old cans and bottles may be put to) And this brings us to our second golden rule of adventuring — pick up everything that you can Like all good rules however this one has its exceptions

If the author/programmer is of a devious frame of mind he will have stuck in a few surprises In *Sorcerer's Castle* for example — which is a particularly good adventure of the traditional kind — various objects are left lying around inviting the adventurer to pick them up You may open a book and find it stuck to your weapon hand or a chest, on being opened will explode in your face Thus the third golden rule of computer adventuring is really a corollary of the first, and an amendment of the second — whilst everything has a purpose said purpose may be sinister so use caution when picking up objects!

But now to some of your letters Bob Franklin of Southampton (a lot of computer freaks down there for some reason) writes about the *Hobbit* and his experiences with the program Bob has found an ingenious short cut back home with the treasure, which gets you there and back using only 50 percent of the adventure He also wonders as I too mentioned earlier what use the Golden Key can be put to Several others have asked the same question so if anyone can enlighten us please let me know

On the subject of scores in the *Hobbit* Paul Vale of Storrington has gone to the other extreme and completed 77.5 per cent without apparently collecting the treasure — which goes to show how rich this adventure can be

Bob Franklin has several interesting points to make — he mentions some of the little bugs that many of you have written about, such as the difficulty in *Saving* an unfinished game, and that annoying habit the program has of whisking away the information just as you are thrown into the dungeon again! But he goes on to say "Otherwise I rate *Hobbit* highly Nothing else I've seen approaches it for sheer fun except perhaps *Pi-man*

"I'm very disappointed in *Inca Curse* for the simple reason that the spelling is so atrocious It seems silly to spoil an adventure with sloppy presentation which five minutes with a dictionary would have cured (*Couldn't agree more Bob and we're being charged good money for these tapes and many others like them Surely the authors could take just a little more time to polish up the finished product* TB)

"*Sorcerer's Castle* is the best of the straight D&D adventures I've found Again I can only agree, and I will have a closer look at this interesting program in a later issue

In the meantime remember what Dracula said when brought to England — *wherever I hang my bat is Home!*

● On the subject of *Hobbit* scores we would be interested to hear who has succeeded in bringing back the treasure with the lowest percentage ■

This series of articles is designed for novice and experienced Adventurers alike Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter So if you have an Adventure you want reviewed or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge Adventure Corner *Popular Computing Weekly* Hobhouse Court 19 Whitcomb Street London WC2 7HF

Cruising & Blind Alley

Cruising

First there was *Space Invaders*, then there was *Pacman* – now there is *Cruising* This all action machine code arcade type game will test your powers of co ordination to the limit Never before has a game asked you to think so quickly or move so fast

Achieving a high score on *Cruising* takes considerable skill and not a little patience

Popular Computing Weekly is offering £10 each month to the player with the highest score on *Cruising* All you have to do to enter this month's competition is send a print out of your highest score, together with your name and address, to

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Each month we will publish the name of the winner and the new *Cruising* high score Are you good enough to accept the *Cruising* challenge?

The highest score sent in so far this month is 8442 from Glenn Fuller of Farnborough Hants If you have a higher score you could still win this month's £10 — but hurry, entries close on April 30

Notes

1) Each entry must consist of a ZX printout and your name and address
2) Closing date for this month's *Cruising* challenge entries is April 30
3) The highest score each month will receive £10
4) High scores cannot be transferred from one month to another
5) The judges decision is final
6) No employees of Sunshine Publications Ltd or their families will be eligible to enter

Blind Alley

Blind Alley is a game of strategy In order to win you must outwit the computer using your craft to fence in and finally destroy the enemy pursuit vehicles But watch out for the solid trail left by your opponents — one touch is fatal!

Each month *Popular Computing Weekly* is giving away £10 to the player with the highest score on *Blind Alley* To enter this month's competition simply send in a copy of your score and the code at the bottom of the score table together with your name and address to

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Blind Alley
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The highest score sent in so far is 6485 from Antony Gregory of Crawley W Sussex Entries for this month's competition close on May 31



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SPEEDED UP!

Anthony Lawlor of Shelley Drive Bletchley Milton Keynes writes

Q **I have recently acquired a Dragon computer and as I am used to the much faster BBC I am finding it very slow To try and speed up my programs, I am thinking of trying to learn machine code for the 6809 Can you recommend any good books on the subject? Further, do you know whether the 6809 accepts the same machine code as the 6502?**

A The only book that I have looked at on the 6809 is by Lance A Leventhall — *6809 Assembly Language Programming* — published by Osborne/McGraw Hill The ISBN is 0-931988 35-7 and it costs £11 95 I would suggest that you try to get a copy through your library

The machine code for a 6502 is not the same as for the 6809 The chips do have a common root but the 6809 is a refinement of the 6502 as indeed is the whole of the 6800 series

AMERICAN RELEASE

Tim Ward of Derby Road Rugby writes

Q **I actually live in America and I hope to buy a Sinclair Spectrum over there when Timex release it Do you know if the Timex will be compatible with the Pal version for hardware? I know that the clock speeds will be different, and that I must change *Pause* from multiples of 50 to multiples of 60 to the second, but will this make any difference to the hardware side?**

Also, when is Softek going to make a compiler for the Spectrum that includes floating point, arrays and strings?

A Until we actually get hold of the American version of the Spectrum (the Timex Sinclair 2000) it is impossible to be absolutely positive on these things However I would doubt that much of the hard and software available over here for the Spectrum will be compatible with the Timex The Timex version is planned to have several important differences from the Spectrum that we know and love

It will have an added Rom slot and a speech chip built in This may sound like a major improvement but it will be done at the expense of the *In/Out* Commands, which will make control of some peripherals much harder

Additionally as you say the timing will probably affect the software as well There is an interrupt every cycle for a frame count this will mean 10 interrupts more per second on the American version than on our version Again only actual testing will reveal what effect this would have on individual programs but it is quite likely to make at least some incompatible

I do not know when or if Softek is going to uprate its compiler but I suggest that you look for an American version, when you have your Timex 2000

ALL THE PINS

Luke Oatham of Baldwins Hill Loughton Essex writes

Q **I have had a Vic20 since October 1982 and all the Rom cartridges that I have bought have had a full row of pins on the back Recently, I purchased *The Count* by Scott Adams It is an adventure game, but it does not have all the pins Is the row of pins meant to be incomplete?**

A The simple thing to do is to see if the program Runs Unless the cartridge is a motherboard or is designed to accommodate further cartridges it is very unlikely that it will use all the data lines available Different add-ons make different uses of the computer and obviously they will only use the particular data lines that they need In a cartridge (were you to take one apart which I do not suggest) you will find that although it might have every data line on the outside on the internal pcb there will be some lines that just finish as dead ends This is true of many computers and their expansion ports

WHAT IS IT?

Arthur French of Roehampton Vale London SW21 writes

Q **I have sometimes seen mentioned phrases such as 'MOS technology' and 'MOS chips' Is MOS a company or what? There is no specific reason why I should know, it is just one of those niggling things that is bugging me**

A Yes MOS is a company but MOS actually stands for Metal Oxide Semi-Conductor It is this technology that has done much to aid the micro revolution When referring to a single gate it describes the three layers that make up that gate A MOS gate looks like

Gate Terminal
METAL
METAL OXIDE
Source Terminal
Drain Terminal
SEMI-CONDUCTOR

MOS technology is the use of a great many of these gates close together Because of their structure there is much less power dissipation than previously This allows much larger circuits and much easier heat dissipation

UP AGAINST THE WALL

John Shiler of Corbyn Street London N4 writes

Q **At a recent microfair I bought a Kempston joystick Although there are adequate instructions on implementing joystick commands from a Basic program, I am stuck with a good game (*Tobor*) that has the control keys in absolutely ridiculous positions — a game that I think would be improved with joysticks**

The problem is that *Tobor* is written totally in machine code, and autoruns, therefore I cannot get at the listing to change it for joysticks. I am up against a wall and really stuck The only thing I can think of is to *Poke* the keys to port 31 (the one to which the joystick is mapped), but I am not sure of how to do this. Can you help?

A The Kempston joystick unlike most others which emulate the cursor keys works on the Input/Output ports What you need to do is change the translation that goes on between the value of the port and the key that is pressed

However this is the sort of question you would probably be better off addressing to the relevant software house In this case a listing of *Tolbor* or those parts which deal with the cursor keys is necessary

NOT TESTED!

Anthony Silver of St James Close Prince Albert Road London NW8 writes

Q **I am the owner of a 48K Spectrum and I am desperately searching for a suitable Centronics interface I am willing to pay for it, even if it is still in the design stage My only requirement is that it can handle the full Ascii character set, graphics do not matter so much. If you or one of your readers can help I would be very grateful**

A By the time you read this Kempston should have one on the market For further details contact Kempston Micro Electronics 180a Bedford Road Kempston Bedfordshire MK42 8BL

I think this letter is important for more reasons than the fact it shows the increasing versatility of the Spectrum I fully appreciate that some people have a very great need for a particular peripheral What worries me is that this is just the sort of customer response that gets manufacturers putting goods on to the market before they have been properly tested

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, PCW, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.



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NEW RELEASES

DOCTOR WHO?

Time Lords is described by its makers as a five-person five-dimensional game. It is a *Dungeons and Dragons* type game where winning is a matter of subtle tactical decisions.

In this game, for BBC model B, you are a time lord and must influence the outcome of history in your favour. There are no lasers or bombs, only various kinds of scanners which reveal information about the state of different parts of the universe.

While a single-player game is quite possible, the program is really designed for up to five people to battle it out.

It should appeal to those who enjoy playing the more traditional games in this genre as well as aspiring Machiavellis everywhere.

Program	*Time Lords*
Price	*£7.95*
Micro	*BBC B*
Supplier	*Red Shift, 12c Manor Road, Stoke Newington, London N16*

SPACE TACTICS

Abacus, a company whose *Avenger* for Spectrum sold over 40,000 copies, has issued another arcade-style program.

Sentinel is described as an entirely original machine code game. You have five space stations protected by four ships. You have to protect your stations from the aliens using the ships which fire guided missiles and photon cannon.

An interesting feature is that the tape contains two versions, the second being for more advanced players. Success depends on the length of time survived rather than the number of hits, and so a fair degree of tactical thinking is required.

Program	*Sentinel*
Price	*£5.00*
Micro	*Spectrum 16/48K*
Supplier	*Abacus Programs, 186 St Helen's Avenue, Swansea*

THE WORM TURNS

In *Mined Out*, Bill the worm (star of *Worm Without A Cause*) is trapped in the mine fields along with his leading lady Nora Mudroe — well, several Nora Mudroes to be exact.

Your task is to rescue both Bill and Nora(s) from the mines, without being blown up yourself. An original concept which could appeal to those who enjoy quirky arcade style games.

Versions are available for both the Dragon and the Spectrum.

Program	*Mined Out*
Price	*£5.95*
Micro	*Dragon 32/Spectrum*
Supplier	*Quicksilva, Palmerston Park House, 13 Palmerston Road, Southampton SO1 1LL*

Losers
poetry Program

MUSICAL MICRO

THE BBC MUSIC PROCESSOR

Latest release from Quicksilva is a Music Processor for the BBC computer. It is claimed to enable the BBC to be used like a synthesiser, plus 4-track recorder and editing desk.

The complicated instruction booklet demonstrates how to design sounds, select channels and play notes using the keyboard. A number of different instruments can be mimicked.

The reverse side of the tape includes a number of music files which can enable your micro to dazzle you with Bach's Brandenburg Concerto or serenade you with a selection of carols.

If you wish, the program will also supply you with a selection of weird noises and Human League impressions.

Program	*Music Processor*
Price	*£14.95*
Micro	*BBC A or B*
Supplier	*Quicksilva, Palmerston Park House, 13 Palmerston Road, Southampton SO1 1LL*

NO RESTAURANT!

Those who loved either the book, radio series, records or tv production of *The Hitchhikers Guide To The Galaxy* can now play the adventure game.

You are an Arthur Dent type of adventurer, although seemingly less naive and innocent since your objective in the game is to collect treasure. The game features characters and places well known to *Hitchhikers* many addicts, although apparently no *Restaurant At The End Of The Universe*. You will obviously have to eat in less dramatic surroundings.

Although text only, the name alone should ensure this game is a success. The game was first issued for the Commodore 64, but versions for the Vic20 and Dragon are also planned. Expect other versions soon.

Program	*Hitchhikers Guide To The Galaxy*
Price	*£13.80*
Micro	*Commodore 64*
Supplier	*Supersoft, Winchester House, Canning Road, Wealdstone, Harrow, Middlesex HA3 7SJ*

HOME GUARD!

City Defence

City Defence from Shards Software is a version of the popular arcade game. Like the arcade original the idea is that you try to destroy the missiles before they obliterate your city.

The game requires one joystick and costs £5.75.

Program	*City Defence*
Price	*£5.75*
Micro	*Dragon 32*
Supplier	*Shards Software, 10 Park Vale Court, Vine Way, Brentwood, Essex CM14 4UR*

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases, Popular Computing Weekly, 19 Whitcomb Street, London WC2 7HF

Ziggurat



The four C's . . .

Last week I proposed a new system of software evaluation — what I call the CO4 criteria — Communication Computation Co ordination and Constitution!

Communication between the user and the program is always very important for a game it can be a key consideration.

I remember reviewing a cartridge for the Vic20 and the controls — for a road racing game — were so complex that it took two of my panel of reviewers to operate them adequately One person took control of changing gears and the other steered

In essence when considering communication we study how the user controls what happens We also study the type of communication keys joystick or paddle and whether the mode of input detracts from the rest of the game Though it is possible to produce exciting games for any computer an intelligent mode of input — one that does not require a degree in ergonomics from the user — certainly helps

Computation is concerned with the way in which the program s results are obtained For example it is rare these days for an arcade-type program to be written in Basic Not very long ago machine code was frowned upon by respectable computer scientists — I have seen space invaders who doddle across the screen at a speed only matched by some computer manufacturers in answering complaining letters Things are different now

In essence when we consider computation we ask ourselves whether the language and the way in which the program is written are adequate to the task How to evaluate this factor is not certain — it might be expressed on a scale from 1 to 99 but would the number actually mean anything?

Co-ordination relates to the way the program as a whole is organised Do the various elements which compose the program have a coherence? In some (so-called) adventure programs the rationale seems to be keep on putting lots of little, spurious tasks in the way of the user and that ll keep em happy

There was one program I remember which was split into two co-ordinated parts the first part consisted of an over-rated business game (all that was required to win was negative gambling stakes) and the second part was a completely unrelated voyage to some foreign land

Some of the best programs are successful because they are so well co-ordinated The original *Pac-man* was a well co-ordinated program and this is why it was so successful Having seen many imitations (as we all have) one could ask how many are so well interrelated? With the advent of super-graphics games (almost space-flight simulations) the importance of co-ordination becomes ever more crucial

Constitution is concerned with the ideas behind the game We read that new software houses promise totally original games but when we examine the games the frog has become a skier has become a trawler has become a tacky ticker

There are certain fixed styles of game and most of the present computer games are simple variants on these fixed styles The main differences now seem to come from the speed of the graphics — Dragon Maze became Pac man and Lem became Lunar Lander and so on for most of the other games around

The success of such a CO4 evaluation system could be gauged by whether the person studying the game finds it helpful If we start to look at say *Constitution* we begin to have to classify types of constitution — this is a *Vaders* game this is a *Maze* game this is a *King* game and so on

What is perhaps more important is that it forces us to actually *think* What is this game really?

Is this *any different* to many other games?

Is it worth paying £8 for yet another one-armed bandit, even though the graphics are superb?

Can beliefs and opinions be quantified to produce such amazing precision that a score of 90 percent 90 percent 90 percent, and 100 percent will only be worth four stars yet 90 percent 90 percent 95 percent, and 90 percent is worth five stars?

It s all in the mind ■

Boris Allan

Puzzle

Under threat!

Puzzle No 52

King Paramount of Primordia was in a fix! The northern border was under threat again from the neighbouring King Grabbem so Paramount was preparing to send his forces north

Said the idle King We ll soon wipe the smile off their faces We have ten regiments, each with the same number of men and I will send them off over a ten-day period so that they will arrive at the border at daily intervals

Beware — there must always be a prime number of men at the border announced Proctalgia the soothsayer "It s in the stars!"

The King called together all the learned men, but none could agree what was to be done

It s really quite easy declared Nausea the King s eldest daughter All you need to do is withhold a few men from the first company that goes north This gives a prime number Thereafter you can send each entire company and on every subsequent day the total number of men at the border will be prime She was right, of course But then she knew how many soldiers there were Can you work it out?

Solution to Puzzle No 47

The problem requires you to find two consecutive numbers in the range 1 — 1000 which if placed to make a single number would equal a perfect square As the problem relates to a book whose pages have even numbers in the left-hand page we start with the lowest value (P) and increment by 2 each step

```
10 FOR P = 2 TO 998 STEP 2 20 LET Q = P + 1 30
LET P$ = (STR$ P) + (STR$ Q) 40 LET R = VAL P$
50 LET S = VAL STR$ (SQR R) 60 IF S = INT S
THEN PRINT R S 70 NEXT P
```

Apart from pages 328 and 329 the only other spread with the property is 528 and 529 — the square of 727 There are also two other pairs of adjacent pages which together form a square but neither are on facing pages 183 and 184 and 715 and 716

Winner of Puzzle No 47

The winner is Ukachi Opara Kingsdale Gardens London W11, who receives £10

Top 10

Atari

1	(4) Defender	(Atari)
2	(—) Chop Lifter	(Broderbund)
3	(2) Axsel Chase	(First Star)†
4	(1) Zaxxon	(DataSoft)
5	(7) Eliminator	(Adventure International)
6	(—) Pac-Man	(Atari)
7	(3) Preppie	(Adventure International)
8	(—) Soccer	(Thorn EMI)
9	(—) Canyon Climber	(DataSoft)
10	(—) Missile Command	(Atari)*

*Cartridge. †32K cassette
(Figures compiled by Calisto Computers Birmingham 021-632 6458)

Books

1	(3) Enter the Dragon *Carter*	(Melbourne House)
2	(2) Spectrum Machine Language for the Absolute Beginner *Tang*	(Melbourne House)
3	(1) Assembly Language Programming for the BBC Micro *Birnbaum*	(Macmillan)
4	(7) Lampute a First Book in Vic, various authors	(Computer)
5	(5) Programming the 6502 *Zaks*	(Sybex)
6	(—) The Power of the Dragon *Sharp*	(Microsource)
7	(4) The BBC Micro — An Expert Guide *James*	(Granada)
8	(—) Lynx Computing *Sinclair*	(Granada)
9	(—) Programming the 6809 *Zaks*	(Sybex)
10	(—) Wordstar Made Easy *Ettlin*	(Osborne)

(Figures compiled by Watford Technical Books Watford 0923 23324)

ZX81*

1	(—) Flight Simulation	(Psion)
2	(9) Gulp 2	(Campbell Systems)
3	(2) Black Crystal	(Carnell)
4	(1) Galaxians	(Artic)
5	(6) Do Not Pass Go	(Workforce)
6	(—) 3D Monster Maze	(JK Greye)
7	(—) Sea War	(Panda)
8	(10) Chess II	(Artic)
9	(—) Paranoid Voyage	(Pollsale)
10	(3) Kong/Dracula	(Tony Roberts)

All 16K.
(Figures compiled by Buffer Micro Shop London 01 769 2887)

Spectrum

1	(—) Penetrator	(Melbourne House)
2	(4) The Hobbit	(Melbourne House)*
3	(—) Cyber Rats	(DK Tronics)
4	(5) Do Not Pass Go	(Workforce)
5	(2) Galaxians	(Artic)
6	(—) Orbiter	(Silversoft)
7	(—) Assembler Editor	(Picturesque)
8	(—) Mad Martha	(Mikrogen)
9	(—) Time Gate	(Quicksilva)
10	(8) Frogger	(A + F)

Requires 48K
(Figures compiled by Buffer Micro Shop London 01 769 2887)

Dragon

1	(1) Donkey King	(Microdeal)
2	(3) Dragon Trek	(Salamander)
3	(2) Katerpillar Attack	(Microdeal)
4	(4) Planet Invasion	(Microdeal)
5	(6) Space Race	(Compusense)
6	(5) Champions	(Peaksoft)
7	(10) Wizard War	(Salamander)
8	(8) Pimania	(Automata)
9	(7) Attack	(PSS)
10	(—) Cosmic Zap	(Microdeal)

(Figures compiled by Dragon Dungeon Ashbourne 0335 44626)
(Last week s positions in brackets)

Vic20

1	(1) Grid Runner	(Llamasoft)
2	(2) Lazer Zone	(Llamasoft)
3	(—) Abductor	(Llamasoft)
4	(—) Space Freaks	(Rabbit)
5	(—) Shark Attack	(Romik)
6	(—) Traxx	(Llamasoft)†
7	(10) Road Race	(Commodore)*
8	(—) Alien	(Commodore)
9	(5) Avenger	(Commodore)*
10	(4) Colossal's House	(Rabbit)†

Cartridge †Requires 8K or 16K. £19K only
(Figures compiled by Vic Centre London 01 992 9904)

BBC*

1	(—) Graphs and Charts	(Acornsoft)
2	(6) Creative Graphics	(Acornsoft)
3	(2) Snapper	(Acornsoft)
4 =	(—) Chess	(Program Power)
	(8) Charts	(Computer Concepts)
	(—) Home Finance	(BBC)†
7 =	(8) Castle of Riddles	(Acornsoft)
	(—) Golf	(Bug-Byte)
	(—) Philosopher's Quest	(Acornsoft)
	(4) Arcade Action	(Acornsoft)

All Model B except marked †Both Models A and B
(Figures compiled by Micro Management Ipswich 0473 59181)